



Journal of Economic Cooperation & Development

Inez Novialita Primanti, Femmy Roeslan
and Fithra Faisal Hastiadi

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Natural Disasters in APEC Countries
(1999-2013)

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Contents

Inez Novialita Primanti, Femmy Roeslan and Fithra Faisal Hastiadi

The Economic Development Impact of Natural Disasters in APEC Countries (1999-2013) 1

Ali Allameh Rad, Zulkefly Abdul Karim, Mohd Azlan Shah Zaidi and Mansor Josoh

Finance and Firm's Growth: Panel Evidence from Selected OPEC Members..... 29

Mohammed Jamshed and Shamim Ahmad

Niche Marketing of Date Palm based Food and Beverages as Health Products 49

Shruti Shastri, A.K. Giri and Geetilaxmi Mohapatra

Fiscal Sustainability in Major South Asian Economies: Evidences from Panel Data Analysis 69

EDITORIAL NOTE

In this issue of the Journal of Economic Cooperation and Development – June 2018, I am proud to present you with four articles selected based on the four-fold themes: (1) Disaster impact on economic development; (2) Finance impact on economic growth, (3) Target marketing and (4) Fiscal Sustainability. I am also honoured to share the valuable information in these articles with scholars in the OIC Member countries and the rest of the world to provide them with a chance to keep up with the pace of the changes occurring in the world economy. Therefore, in this issue, the articles accord a detailed analysis of the themes related to the impact of natural disasters on economies which accentuates the need for APEC countries to rebalance its socio-economic variables of government more toward domestic and regional demand; examine thoroughly the point that the roles of finance on economic growth accentuate the function of internal and external finance upon firms' growth and their economic integration; also emphasize the idea that, in order to target a market and achieve a decent level of a competitive edge, a need of product diversification and innovation is required; and finally, stress the point that fiscal sustainability and commitment to a long term fiscal discipline indicate a positive long-run response.

The first article states that income reduces disaster risks in forms of human loss. Socio-economic variables, such as trade openness, size of government and corruption level as well as economic damages as another disaster impact measurement, are measured by utilizing disaster impact data over 15-year span on 18 APEC economies. The results found that, applying pooled least squares, random and fixed effect model, human losses and economic damages as forms of disaster risks are reduced by higher income per capita, higher educational attainment and trade openness, added with smaller government size and lower corruption level. Thus, study is premised on the belief that as economies develop, the process of development itself will cater reduction upon natural disaster impact.

The second article examines the roles of finance on economic growth at macro level, particularly the role of internal and external finance upon firms' growth. The study also concentrates on the financial development and firms' growth in Organization of Petroleum Exporting Countries (OPEC) as the developing countries and aims to investigate the role of financial development and other important factors on firm growth. The paper findings represent positive effect of internal finance using elevating cash flow but the negative impact of external finance by means of leveraging on the firms' growth. Thus, firms' growth is accelerated by reducing the cost of doing business in such countries.

The third article sets out that a ‘Target Marketing’ approach may be suitable for achieving a competitive edge by date palm sellers and overcoming the difficulties like seasonality, high volumes, intense competition, and income stagnancy. The study also announces that offering innovative premium products to the quality conscious segments and developing new date-based minimally processed foods, processed culinary ingredients and ready-to-consume processed foods and beverages as substitutes to unhealthy ultra-processed products will benefit the marketers and the consumers both. Therefore, a coordinated effort will give the date industry a sustainable growth and the people a healthy life.

The fourth and last article examines the issue of fiscal sustainability for a panel of five major South Asian economies namely, India, Pakistan, Bangladesh, Sri Lanka and Nepal, for the period from 1985-2014. The study confirms the presence of a long-run relationship between government revenue and expenditure, which indicates a positive long-run response of the primary balance to the rising public debt ratio. Hence, the weak sustainability underscores the need for commitment to long-term fiscal discipline and justifies the ongoing efforts by the South Asian countries to strengthen their fiscal positions.

Amb. Musa KULAKLIKAYA
Editor-in-chief

The Economic Development Impact of Natural Disasters in APEC Countries (1999-2013)

Inez Novialita Primanti¹, Femmy Roeslan² and
Fithra Faisal Hastiadi³

Previous empirical literature has found that income reduces disaster risks in forms of human loss. This study will add socio-economic variables, such as trade openness, size of government and corruption level as well as economic damages as another disaster impact measurement. This study utilizes disaster impact data over 15-year span on 18 APEC economies and has found that, applying pooled least squares, random and fixed effect model, human losses and economic damages as forms of disaster risks are reduced by higher income per capita, higher educational attainment and trade openness, added with smaller government size and lower corruption level.

Keywords: Economic Development, Natural Disasters, Trade, GDP per capita, Government Expenditure, Corruption, APEC

1. Introduction

The strings of natural disasters have brought devastating impact on the affected countries. For either high, middle, or low-income countries, the tremendous power of nature has managed to disrupt the economies through generating both severe human and economic losses. Huge natural disasters worldwide including the tsunami that hit coastal regions of Southeast Asia in 2004, hurricanes in the coastal United States and the Caribbean, as well as floods which are disasters with high level of occurrence in some countries, have acted as shocking reminders that

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nature could affect deaths and economic damages in all countries altogether.

Between 1970 and 2001, natural disasters in global scale killed an estimated of 2.69 billion people and led to US\$955 billion in economic damages (Kellenberg & Mobarak, 2008), and the number remains enormous even until current period. Through available evidences, it is very important for the damage impacts caused by natural disasters to be taken into full consideration by each country. The world has witnessed that APEC, as an economic cooperation of Asia-Pacific region that accounted for 56 percent of global economic output in 2011 and comprised nearly three billion people in 2011 and 44 percent of global trade, during the past 10 years has suffered significantly from the disaster events generating significant human, financial, and economic losses.

Natural disasters such as earthquakes, floods, tsunamis, and volcanic eruptions are common threats to many countries in the Asia-Pacific region that sit on the so-called “Pacific Ring of Fire”, an area of high volcanic and seismic activities surrounding the basin of Pacific Ocean, which is home to over 75 percent of the world’s volcanoes and 90 percent of the world’s earthquakes (TFEP, 2008).

In 2012, seven of the ten costliest disaster events, measured by overall losses, occurred in APEC economies (OECD Secretariat, 2013). Collectively, Japan and the 20 other APEC member economies that are home to about three billion people were hit by over 70 percent of natural disasters worldwide. As for the economic damages incurred, APEC member economies suffered US\$68 billion annually in related costs from 2003 until 2013. Economies in APEC are thus extremely devastated by disasters.

As economies develop, the impact of natural disasters in a form of human losses and economic damages from natural disasters shall be diminished. The logic is that as an economy develops, it devotes greater resources to safety including implementing precaution measures designed to reduce the impacts of natural disasters (Toya & Skidmore, 2006). Income level and other variables of economic development are also better off, thereby helping to reduce the impact. Thus for an economy to be better managed and able to mitigate the damage caused by the disasters, its development is truly critical. Another study by Padly et al. (2010) accentuates the

significant impact of income in reducing the disastrous effect of natural disasters. It follows Rasmussen (2004) and Kahn (2005) who also find that countries with higher per capita income are relatively less impacted by the catastrophic event.

According to UNDP, countries might face similar pattern of natural disasters, but they often experience widely differing impacts when disasters occur. As countries become more prosperous, they are often better able to afford the investments needed to build houses and infrastructures that are more likely to withstand earthquakes, for example, in comparison with the less prosperous ones. It is intriguing then to find out the impact of economic development and reduction in natural disaster impact.

A study conducted by Kellenberg and Mobarak (2008) on natural disaster, using a country-year panel data set, indicates that there is a non-linear relationship between disaster risk and income level. Kellenberg and Mobarak (2008) argue that disaster risk exposure might increase with rising income in low-income countries due to urbanization and development (p.789). And facing downturn, as countries get richer due to better institutions, infrastructure, better construction in dwellings and technologies as well as safety concern development.

Based on a cross-sectional sample of countries in 2004, UNDP reports on disaster risks reduction provide evidences on how economic development (GDP per capita and the Human Development Index) has negative correlations with deaths caused by natural disaster events in a country.

Previous literature by Toya and Skidmore in 2006 argues that countries with higher economic development experience fewer losses overall and that other indicators beside income, such as educational attainment, trade openness and government expenditure, play a big role in mitigating the disaster damage. Richer nations also claim to suffer less deaths and damages according to Kahn (2005), although they do not experience fewer disasters compared to poor countries.

This research is premised on the belief that as economies develop, the process of development itself will cater reduction upon natural disaster impact. Specifically, the study will see how APEC countries' level of development, ranging from developing to developed countries, affects its

vulnerability to natural disasters during 1999-2013. In differentiating this study with the prior ones, the period used will be renewed and the observed countries will be narrowed down into 18 of APEC member economies. Considering APEC member countries have suffered massive amount of natural disasters followed by related tragic losses and yet the understanding of their relevance to economic development is still poor, it is thus interesting to conduct a study on this issue and concentrating on APEC as the subject.

2. Economic Development and Natural Disaster Impact

Basic Development Indicators

A very wide variety of indicators then can be used to characterize the difference between developed and developing countries. However, according to (Todaro & Smith, 2012), there are basic indicators of three aspects of development: real income per capita adjusted for purchasing power; health as measured by life expectancy, undernourishment, and child mortality; and educational attainments as measured by literacy and schooling.

Natural Disasters and Damages

Natural disaster is defined as a serious disruption triggered by a natural hazard causing human, material, economic or environmental losses, which exceed the ability of those affected to cope (UNDP, 2004). It refers to natural processes or phenomena occurring in the biosphere that may constitute a damaging event.

The Centre for Research on the Epidemiology of Disasters (CRED) defines a disaster as a “situation or event, which overwhelms local capacity, necessitating a request to national or international level for external assistance; an unforeseen and often sudden event that causes great damage.” Natural disasters as defined by CRED are further classified into several groups, namely stated in the table 2.1 below.

Table 2.1: Natural Disaster Classifications

Disaster Subgroups	Disaster Main-Type	Disaster Sub-Type
Geophysical	Earthquake, Mass movement, Volcanic activity	Ground shaking, Tsunami, Ash fall, lahar, lava flow
Meteorological	Storm, Extreme temperature, Fog	Thunderstorm, Tornado, Wind, Freeze
Hydrological	Flood, Landslide, Wave Action	Coastal, Riverine, Ice jam Flood, Avalanche (snow, debris, mudflow)
Climatological	Drought, Glacial lake outburst, Wildfire	Forest Fire, Land Fire
Biological	Epidemic, Insect infestation, Animal accident	Bacterial, viral, fungal, parasitic prion diseases
Extraterrestrial	Impact, Space weather	Airburst, shockwave

Source: OFDA/CRED EMDAT classification

Each of the five types of natural disasters that will be used in this study can be defined according to various sources. Floods are defined as significant rises of the water level in stream, lake, reservoir and coastal region (Kahn, 2005). Earthquakes are sudden breaks within the upper layers of the earth, sometimes breaking the surface resulting in the vibration of the ground (Kahn, 2005). Webster et al. (2005) define storm as a violent disturbance of the atmosphere with strong winds attaining surface wind speeds between 18 and 33 m s⁻¹. Lastly, landslides are defined as sliding movements on the earth's surface (Lakakis, 2009).

Types of Damages

Disasters present a broad range of impacts, with potentially long-lasting, multi-generational effects. In other words, natural phenomena do not only produce immediate apparent effects, but they also unleash aftereffects that evolve slowly or emerge a relatively long time after the disaster has

occurred. In addition to causing direct damages to lives, buildings, equipment and infrastructure, they may produce major indirect consequences such as business interruption, loss of employment and output, and the like. Consequently, such classification of natural disasters' damages exists.

Expressed in simplest terms based on ECLAC report on estimating damages from disasters, a disaster could affects assets (direct damages); the flow for the production of goods and services (indirect losses); and the performance of the main macroeconomic aggregates of the affected country (macroeconomic effects).

Table 2.2: Comparisons between Types of Damages

Direct Damages	Indirect Damages	Macroeconomic Impact
Damages to home and content	Business interruption	The loss of the sector's contribution to the development growth rate of the national or local economy
Damages to firm structure, inventories and content	Losses in industrial and farming production	Effects on employment (labor force)
Damage to infrastructure	Costly adaptation from loss of use (i.e. greater transportation costs)	Effects on the external sector
Mortality and injury	Mortality and morbidity	Effects on public finances
Environmental degradation	Decreased tax revenues	Effects on prices and inflation
Emergency response and cleanup	Impaired institutional capacities	

Source: Kousky, Carolyn; Informing Climate Adaptation; and ECLAC; further processed

3. Links between economic development and natural disaster risk

Up until today, the development on literatures that link natural disasters with economic development is becoming more apparent. Not only impact measurement of natural disaster toward economies, but it is also growing critical to measure the relationship in reverse. The higher the economic development, the lesser will that particular economy suffer from higher level of death counts and economic damages caused by natural disaster event.

It is only natural to state that as economies advance, the impacts in forms of deaths and economic damages from natural disasters shall move in the opposite direction. The logic is when a country gets richer, there will be a better chance for it to survive due to better logistics. By measuring the economic development impact on human losses and economic damages from natural disasters do experience fewer losses. The authors' main objective is to show that higher income followed by high education, greater openness, more complete financial systems and smaller government is also important. The study is conducted using annual data across 151 countries over the 1960-2003 period.

Adding prior findings, one of the most visible conceptual links between economic development indicators and natural disaster impact is that as GDP per capita increases, the numbers of deaths are reduced along the way. Kahn in 2005 has found that richer nations do not experience fewer disaster shocks than the poorer nations, but they do suffer fewer deaths from natural disasters and has concluded that there exists a negative relationship between GDP per capita and deaths from natural disasters. One of the possible reasoning is when income per capita increases, people will demand homes that are located in safer communities and are built on stronger and durable material, thereby helping to reduce death counts (Kahn, 2005).

Another possible link would be, according to Kellenberg and Mobarak study in 2008, that in metropolitan areas, disaster impact may be mitigated by larger number of people having access to more adequate economic and social institutions, well designed infrastructure, and competent urban planning, which are not found in more rural locations (p. 792). Following Kellenberg and Mobarak study, development may also lower disaster risk exposure by raising the quality of education and access to

health care (p. 792). Education level serves as one of the standard measurement of economic development, which holds certain impact upon disaster risk. Kellenberg & Mobarak (2008) however find that there is a nonlinear relationship where disaster risk, associated with flooding, landslides and windstorms, increases with incomes up to GDP per capita levels of \$5044, \$3360, and \$4468 per year respectively and decreases after that (p. 795). They argue that disaster risk might increase with rising income in low-income countries due to urbanization and development. While the downturn in disaster damages as countries get richer due to better institutions, infrastructure, better construction in dwellings and technologies as well as safety concern development.

A better-developed economy followed by a higher level of education (Toya & Skidmore, 2006), where in this study is indicated by mean of total years schooling, implies that citizens are able to make better choices with safety concern on location decisions that subsequently result in fewer deaths from disasters (p. 22). Educated populations are also naturally more capable of circulating information and relaying risk prevention measures (UNDP, 2004).

Greater openness from trade that represents the degree of competition and transfer of technological knowledge from abroad might also lead to a reduction in damages risk from natural disasters (Toya & Skidmore, 2006). A higher degree of technological transfer would ameliorate disaster prevention program and improve building codes, thus reducing disaster impacts.

Another conceptual link, according to Toya and Skidmore findings in 2006, a larger government, measured from its expenditure, may indicate greater public assistance; hence stronger social response mitigating disaster risk. Infrastructure and structural soundness of a building should also become better made as the general government spending grows and therefore leads to a reduction in human loss and monetary damages related to disasters. Richer nations with higher economic development and large government may also invest in specific technology, for instance computer modeling of storms which spreads early warning information before the storm hits shore and thus saving lives (Kahn, 2005, p. 277). Kahn also believes that government corruption could increase deaths counts through the lack of enforcement of building codes, zoning, and infrastructure quality.

However, higher general government expenditure, or the larger the size of the government, the less efficient it might become in handling disaster response. For instance, the victims of Kobe Earthquake in Japan, studied by (Horwich, 2000), received slow government response.

Apart from its positive sides, economic development however may also pose significant impacts on environmental quality and effects of natural disasters according to (Kellenberg & Mobarak, 2008). For example in some South and Central American countries, (p. 792) where destruction of forests occurred due to pressure in developing agricultural land, the populations are more exposed to floods and landslides risks.

The last relevant findings would come from Padli & Muzafar (2009) who discover results suggesting that the relationship between disaster losses and the level of economic development is nonlinear in nature. Moreover, reporting that at lower income level, a country is more disaster-resilient, but at higher income level, an economy becomes less disaster-resistant.

4. Empirical Model

This study employs *pooled* data on selected natural disaster events and macroeconomic data act as a proxy of economic development of each country across 15-year span (1999-2013) and then the data collected will be limited to this period only. The data utilized in this study will be secondary data for all experimented variables, including natural disaster impacts and economic development indicators data. Natural disaster impacts as dependent variables are labeled into total human loss and missing (DEATHS), but for presumed dead and (Econ_Damages) monetary damage caused by natural disaster events, the data will be obtained from the EM-DAT database by OFDA/CRED, which has proven to be a very useful tool for analyzing human losses or monetary damages caused by natural disasters (Felbermayr & Gröschl, 2014).

As for the macroeconomic data that act as independent variables, different sources will apply for certain variables. *GDP per capita* (PCGDP) that reflects income per capita, *Trade openness* (OP) as a percentage of GDP, size of government as indicated by *general government expenditure per GDP* (SIZE) are extracted from the World Bank database. While *Corruption Perception Index* (CPI) that measures perspective of

corruption level in a country is obtained through Euro-Monitor International from Transparency International.

The selected natural disasters will vary from different natural disaster subgroups; geophysical (earthquake and volcanic eruption), hydrological (flood and landslide) and meteorological (storm) which appear to be top most frequent disasters suffered by APEC countries. All of the samples will be limited to APEC member countries only and narrowed down to 18 countries observed in total and further classified into nine middle-income countries and nine high-income countries that can be examined in table 4.1.

Table 4.1: Samples of 18 APEC Member Countries

Developing Countries	Developed Countries
China	Japan
Indonesia	USA
Vietnam	New Zealand
Philippines	Russia
Thailand	Canada
Korea Rep	Australia
Mexico	Chile
Malaysia	Hong Kong
Peru	Singapore

Two sets of models are used in this research where it is constructed based on Toya & Skidmore (2006) and are modified by adding new independent variables that apply for both models.

$$(\ln_deaths_{jit}) = \beta_0 + \beta_1(PCGDP_{it}) + \beta_2(Op_{it}) + \beta_3(SIZE_{it}) + \beta_5(CPI_{it}) + \beta_6(y_{jit}) + \varepsilon_{jit} \quad (1)$$

Where the dependent variable in the first model above (Eq. 1) denotes $deaths_{jit}$ or human loss (total deaths) that comprises the number of people who lost their life from the disaster and the number of missing people whose whereabouts are unknown since the time of the disaster event; hence they are presumed dead. It basically reflects as number of human losses caused by natural disaster event j in country i during period t . The value of deaths is measured in natural logarithmic forms.

$$(\ln_econ_damages_{jit}) = \beta_0 + \beta_1(PCGDP_{it}) + \beta_2(Op_{it}) + \beta_3(SIZE_{it}) + \beta_5(CPI_{it}) + \beta_6(y_{jit}) + \varepsilon_{jit} \quad (2)$$

Meanwhile, the second model measures the impact of the independent variables upon economic damages ($damages/GDP_{it}$), in which the damages value refers to the amount of damage to property, crops and livestock, measured in logarithmic form. The figure is the estimated damage in real US\$ at the moment of the event or it simply reflects monetary damage caused by disasters incurred from a natural disaster event j in country i at time t . To better identify damages suffered in proportioned to countries' GDP, the economic damages will be presented as a share of GDP in respective countries.

As for the independent variables, both Eq. 1 and 2 consist of $pcgdp_{it}$ that represents natural logarithm of real gross domestic product per capita; Op_{it} serves as trade openness ((Export+Import)/GDP) in a country; $SIZE_{it}$ represents general government expenditure/GDP; CPI_{it} indicates corruption level measured through Corruption Perceptions Index; while y_{jit} represents additional variables that could affect deaths from natural disasters, such as series of occurrence per natural disaster events and number of population.

The authors hypothesize that higher income per capita increases sense of safety, allowing countries to employ more costly precaution measures and further leading to lower disaster impacts. Greater openness here serves as a proxy for the degree of transferal of technological knowledge from abroad that reduces impact. The higher the trade openness, the lower should the disaster impact be. The larger the size of the government, the more sources a country has to improve the infrastructure, education services and stronger disaster response impact, all of which lead to disaster impact reduction. On the other hand, higher corruption results in lower quality of building blocks, and reduce fund allocated for disaster management, thus increasing deaths and damages caused by natural disaster events. The lower the CPI, the more corrupt a country, the negative the relationship will be. Higher disaster event occurrences and the number of population lead to higher death counts and economic damages.

5. Estimation Results

This study basically involves two different models that require separate treatment or method to generate the estimation results. There are three types of method of processing the data and performing the regressions that will be used in this study; PLS (Pooled Least Squares), Fixed Effect and Random Effect method, founded from proper testing for method with the best fit for each model.

After applying the required procedures in finding the proper method to be used to estimate the model, the first model will be run with Error Components Model or simply *Random Effects Model* that was obtained through proper tests procedures that have been elaborated in previous chapter.

However when the regression is restricted into two parts, developing and developed economies only, the method applied differs from the prior full sample models. The restricted regressions on the first model employ *Pooled Least Squares* approach, deriving from the *Breusch/Pagan Test*. As for the Fixed Effect Model, it is applied based on significant value in Chow Test results. This condition is applicable to the second model on economic damages as well.

Table 5.1: Natural Disaster Losses and Economic Development:
All Countries

Dependent Variables	Log (Deaths) (1)	Log (Economic Damages) (2)
GDP per Capita (Ln_PCGDP)	-0.739843**	2.801371**
Trade Openness (OP)	-0.0015594	-0.0302093*
Size of Government (SIZE)	-0.0044542	0.0063779
Corruption Level (CPI)	-0.0746305	-0.612304
Log of Population (Ln_Pop)	0.3349821	-
Storm	0.1286944***	0.1257169
Flood	0.0023391	-0.0431219
Earthquake	0.2456528***	0.4809086***
Landslide	0.2966076***	0.0949199
Volcanic	0.5112635**	0.4701551
No. of Observations	211	189
R ²	0.6223	0.0260

Notes: *) Significant at the 10% level, **) Significant at the 5% level,
***) Significant at the 1% level

Table 5.1 presents regression estimates for the number of deaths and economic damages equations using the full sample or all 18 APEC member countries. The results suggest that the only significant variable is income per capita, which is consistent with the prior findings by Toya and Skidmore (YEAR). In the interim, the rest of the significant variables are the number of occurrence of storm, earthquake, landslides, and volcanic activity, in affecting the total deaths.

As for the second dependent variable in column (2), income per capita is significant in affecting economic damages. Trade openness also plays a significant role, followed by some controlling variables of disaster

occurrences, namely earthquake, as the type of disaster that significantly affects economic damages.

GDP per capita has significantly been able to inversely affect the dependent variable, i.e. total death toll caused by natural disaster event in APEC economies. This is consistent with the proposed hypothesis. In column (1), a coefficient of 0.74 in GDP per capita highlights that when income per capita increases by one percent, the total deaths by disaster will be reduced by 0.74 percent during the observed years. This condition is appropriate as the higher the income per capita in a country, the higher their sense of safety and their willingness to afford any additional costly precautionary measures for avoiding disasters. For instance, houses that are located near landslide-prone area are usually cheaper than those that are not; hence higher income per capita will let them to pick more costly but safer housing location. Aside from location, houses that are built on stronger and durable material also help to reduce death count (Kahn, 2005) and can be achieved by higher level of income per capita.

Size of government is also consistent with the hypothesis that it has inverse relationship with deaths. As general government expenditure increases by one percent, human fatalities will decrease by 0.004 percent. Reduction in corruption level by one unit, which is shown in higher Corruption Perceptions Index value, is also able to reduce deaths by 0.074 percent that is again consistent with the hypothesis. It goes the same for trade openness where an increase in trade by one percent leads to increase in deaths by 0.001 percent. However, these three variables are not significant in the human losses model.

In table 5.1 it appears that storm, earthquake, landslide and volcanic activities are the disaster events that are significantly increasing the human fatalities in the 18 APEC economies, with volcanic activity having the largest coefficient magnitude in increasing death counts. An increase in volcanic activity event by one time will increase deaths by 0.511 percent since some of the APEC countries sit in the so-called Ring of Fire, where they experience severe volcanic activity.

As for the second model (damages/GDP) in column 2, the method used for this particular model is Fixed Effect, as proven through the value of Prob>F in *chow test* of 0.000 and an insignificant value of Prob>Chibar2 with 0.1831 in *Breusch and Pagan Lagrangian multiplier test*.

In column 2, however, the result is inconsistent with the hypothesis of having a positive relationship between GDP per capita and economic damages/GDP for all APEC countries. The positive coefficient of 2.8 indicates that a one percent increase in GDP per capita will increase economic damages in proportion to GDP by 2.8 percent. Such thing can happen since when income per capita increases, as frequently found in developing countries, the higher the income, the higher as well the damages suffered from disasters. When income per capita is increasing, it means that countries are becoming richer and when development takes place, the number of infrastructure, built by removing forests and/or locating buildings near the shores, will increase. When this happens, more infrastructures are built and forest reduction that could lessen disaster damages will increase the damages/GDP.

Trade openness, as another significant variable of interest in reducing damages/GDP, is consistent with the hypothesis by embedding a negative relationship. The negative coefficient of 0.03 indicates that when trade openness increases by one percent, it will reduce damages/GDP by 0.03 percent. This condition persists because as openness increases, the degree of technological transfer improves and higher technological transfer can lead to better building codes and better construction of dwellings, and thus strengthening the infrastructure capability in facing disasters, which ultimately results in lower damages from disasters.

Corruption level, albeit having a consistent relationship with the hypothesis, is not significant in affecting damages/GDP. Size of government, on the other hand, is not consistent with the hypothesis by having a positive relationship and it is not significant either.

The most significant disaster events in affecting damages/GDP in APEC countries would be earthquake with a p-value of 0.005. Subsequently, an increase in earthquake occurrence by one time means an increase in damages in proportion to GDP by 0.48 percent.

Table 5.2: Natural Disaster Losses and Economic Development:
Developing Countries

Dependent Variables	Log (Deaths) (1)	Log (Economic Damages) (2)
GDP per Capita (Ln_PCGDP)	-0.4167842	-0.9591021
Trade Openness (OP)	0.0036423	0.0083765
Size of Government (SIZE)	-0.0047623	-0.023786***
Corruption Level (CPI)	-0.3333658	0.748385
Log of Population (Ln_Pop)	1.615866	-
Storm	0.122764*	0.3096725***
Flood	-0.0179998	-0.1459954*
Earthquake	0.3277999***	0.2601806
Landslide	0.2896762***	-0.1489856
Volcanic	0.6630816***	0.3998032
No of Observations	127	105
R ²	0.5431	0.2347

Notes: *) Significant at the 10% level, **) Significant at the 5% level,
***) Significant at the 1% level

This restricted model for developing countries only utilizes different method, which is Fixed Effect Model. Different from the full sample model, in column (1), none of the variables of interests is significant in affecting death counts in developing countries. Meanwhile, in the case of the disaster event occurrences as the controlling variables that could also affect deaths, there are four disasters that significantly increase total death toll in APEC developing economies, namely storm, earthquake, landslides, and volcanic activity.

The four variables of interest have consistent relationship with the proposed hypothesis, except for trade openness for having positive relationship with the death count in APEC developing economies. This is

because a high level of trade for developing countries could endanger domestic firms for having to compete with international firms. These domestic companies might need to lay off workers to cut costs, which will cause unemployment and lower income per capita. This situation will also prevent these companies from performing additional costly disaster prevention, thereby leading to more deaths. Still, none of them is significant in affecting death counts in APEC developing economies.

Storm, earthquake, landslide and volcanic activities are the four disaster events that manage to bring significant impact upon the increase in deaths by disasters. All of them are positively correlated and aligned with the hypothesis. With volcanic activity holding the highest coefficient magnitude of 0.66, that represents an increase in volcanic events by one time, the death count will increase by 0.66 percent. Second largest coefficient magnitude of 0.33 is held by earthquake.

Some of the APEC member economies are located in the Pacific Ring of Fire, namely Indonesia and the Philippines. This location is consistent with the results that earthquake and volcanic activity will be the disaster events that will significantly bring largest impact upon human losses in APEC developing countries.

The second model for developing countries, as seen in column (2), utilizes Pooled Least Square as the appropriate method for conducting the proper testing. However heteroscedasticity is found ($\text{Prob} > \text{Chi}^2 = 0.0232$) and further treatment to make the regression *robust* is performed. The results reported below are in robust estimates. Both autocorrelation and high multicollinearity between the regressors are absent.

After performing robust estimation, the R^2 has improved value of 0.235, which indicates that this model is able to explain 23.5 percent of all the variability effect between the independent variables and the dependent variables.

As what can be observed from Table 5.2 column (2), the only significant variable is the size of government as measured with general government expenditure in proportion to GDP coefficient and a couple of disaster event occurrences, storm and flood.

The size of government is consistent with the hypothesis, that is negatively related the damages/GDP. A coefficient of -0.024 in the Size of Government and with a p-value of 0.000 indicates that size of government is highly significant in reducing the damages/GDP caused by disasters. The interpretation stands for an increase in general government expenditure (size of government) by one percent will reduce damages/GDP by 0.024%.

This condition holds because, as what the hypothesis has proposed, higher government expenditure means that government in a country has increased its spending and allocated it to different sectors, including infrastructure, building codes, education, as well as disaster management program that will eventually lead to lower damages/GDP. In developing countries, government expenditure will certainly play a big role in affecting the economic development. Within the table, we can see that the country holding highest general government expenditure in proportion to GDP is Philippines (109 percent), which is a country inside developing group.

As for the rest of the variables of interests, GDP per capita is consistent with the hypothesis of negative relationship and so is the corruption level. Meanwhile, trade openness is again positively related with damages/GDP. However, those three variables are not significant in affecting damages/GDP in developing countries.

Storm and flood also significantly affect the damages/GDP in developing countries, with storm holding the highest coefficient magnitude compared to that of flood. Storm and flood are basically types of disaster events that could cause significant damage on crops, property, and livestock, making it consistent with the estimation results.

Table 5.3: Natural Disaster Losses and Economic Development:
Developed Countries

Dependent Variables	Log (Deaths) (1)	Log (Economic Damages) (2)
GDP per Capita (Ln_PCGDP)	-1.508026	2.058986
Trade Openness (OP)	-0.0006105	-0.0947243*
Size of Government (SIZE)	-0.0212908	0.7322295**
Corruption Level (CPI)	0.3740325*	-1.507622*
Log of Population (Ln_Pop)	0.8851633***	-
Storm	0.127391*	0.0207771
Flood	0.0201241	0.0623536
Earthquake	0.4509196*	0.9990224**
Landslide	0.9049964*	0.9075745
Volcanic	-0.3461145	-0.0680176
No of Observations	84	84
R ²	0.4910	0.1333

Notes: *) Significant at the 10% level, **) Significant at the 5% level,
 ***) Significant at the 1% level.

Results from table 5.3 will be restricted on nine APEC developed countries only. In the deaths model regression, the method used will be Pooled Least Squares in accordance with the developing model.

The only significant variable of interest in Column (1) is corruption level. Moreover, log of population, storm, earthquake, and landslide occurrences are also significant and positively correlated with the dependent variables.

Corruption level is significant in the developed countries. Yet, the relationship is not in accordance with the proposed hypothesis. The coefficient value of 0.374 indicates that an increase in one unit of CPI signifies an increase in deaths by 0.374 percent. In other words, when

corruption level decreases (increase in CPI), the number deaths by disaster increases.

This positive correlation can be affected by certain factors. The financial crisis in 2007-2008 has brought impact upon United States as a whole, including hurting government budget. Assuming that the corruption level is declining, which leads to more funds to be allocated for disaster management during the recovery period, the Federal spending is allocated mostly in government's bailout for banks to revive the economy. To get the funds for bailout, government must either borrow or squeeze tax out of the economy. Tax revenue allocation will then be mainly used for huge bailouts and automatically reducing the fund allocation for other sector, including infrastructures and disaster management, which might lead to more deaths.

Another significant variable is log of population where it shows a positive correlation with human losses by disaster. This estimation results are aligned with the proposed hypothesis that the larger the population, the more the deaths caused by natural disaster events.

As for the column 2, the R-squared has improved to 0.1333, which indicates that the model can explain 13.3 percent of all the variability effect between independent variables and the dependent variables.

Variables of interest that is significant in affecting damages/GDP in APEC developing economies will be trade openness, size of government and corruption level, followed by controlling variable of disaster events namely earthquake.

Trade openness shows an increase relationship with the damages deriving from disasters in developing economies. A negative coefficient of 0.095 indicates that an increase in trade openness by one percent will significantly reduce damages/GDP in developing countries by 0.095 percent. This condition persists because again as openness increases, the degree of technological transfer improves, and higher technological transfer can lead to better building codes and better construction of dwellings, which ultimately lead to lower disaster impacts.

According to Kahn in 2005, richer governments or governments with high level of expenditure can provide implicit disaster insurance through

effective regulation and planning and by providing quality infrastructure. However, Toya and Skidmore in 2006 also found that size of government was inversely related with the damages/GDP suffered from disasters. As they say, the larger the government, the less responsive and less efficient it becomes in handling disaster response initiatives, such in the case of Kobe earthquake, when the government had a slower response than the market-oriented Japanese Mafia.

This study has found similar findings to that of Toya and Skidmore (2006) that argues when size of government increases by one percent, the damages/GDP in developed countries surges by 0.732 percent, showing inconsistency with the hypothesis.

Corruption level measured with Corruption Perceptions Index (CPI) has the desired coefficient direction and significantly affects the damages/GDP deriving from disasters in APEC developed economies. It is crucial to remember that the lower the value of the CPI, the more corrupt a country is and vice versa. Accordingly the negative relationship implies that every increase in the CPI value suggests reduction in disaster damages. The statement indicates that when CPI value increases by one point, corruption level falls, and damages/GDP drops significantly by 1.51 percent.

This estimation results is in accordance with the hypothesis that higher corruption leads to more damages/GDP incurred, especially when earthquake, flood, storm and landslides play a role in it. Funds that are supposedly allocated for improving infrastructures or building codes are corrupted and set in motion poor level of building codes. Shoddy school construction in Sichuan China due to corruption, for instance, was politically alleged in increasing the amount of deaths caused by Earthquake with 88305 people were confirmed dead and missing, thus presumed dead, making it the highest death toll in China since 1999-2013 (EM-DAT). Higher corruption level makes infrastructure become less resilient in facing disaster events and brings about more damages suffered from disasters.

Earthquake events being the controlling variable holds significant impact in increasing the damages/GDP suffered in APEC developed countries. An increase in earthquake occurrence by one time denotes an increase in damages/GDP by 0.99 percent. Aside from being the only significant

disaster events, earthquake also holds the highest magnitude among the others in affecting damages since earthquake might be able to bring the largest impact in increasing damages per GDP such what happened in Japan, where the damages due to earthquake reached US\$212 billion in 2011.

6. Conclusion

Human fatalities caused by natural disaster events have becoming more apparent in the past years. APEC economies as a strong economic cooperation has also suffered from severe losses due to natural disaster. The amount human losses and damages sustained are highly apparent and therefore it is captivating to observe APEC economies as the samples in this study. This study is conducted to measure the impact of economic development, measured through several proxies, on human fatalities in 18 studied APEC economies from 1999-2013.

In general, the results obtained from both model regressions conclude that higher income per capita manages to reduce total deaths when regressing all countries altogether. Nevertheless, it increases economic damages/GDP induced from disasters. The higher the income per capita, the higher the sense of safety and the capability to afford costly precautionary measures, thereby leading to lower death counts. This condition suffices the hypothesis that when GDP per capita increases, death counts are reduced.

Higher trade openness reduces damages/GDP in all countries regression and even more when it is restricted to developed countries regression. The result demonstrates that an increase in trade by one percent leads to increase in deaths. Nonetheless, these three variables are not significant in the human losses model.

Larger size of government has significantly reduced damages/GDP in developing countries especially. As at this stage of economies, government may have greatest impact in reducing disaster impacts and on economic development. The size of government is also inversely related with deaths that as government expenditure increases by one percent, human fatalities will decrease. Lower corruption level reduces damages/GDP from disasters in developing countries but increases deaths in developed countries because some of the un-corrupted funds might not

be efficiently allocated toward disaster impacts reduction measures. Reduction in corruption level (shown through higher CPI value) by one unit also manages to reduce deaths. Moreover, population and disaster event variables have positive impact with the death counts in developed countries, yet this does not hold in developing countries. Some differences are also found in the variables of development being significant in reducing the disaster impacts, between developing and developed countries. Developed countries with higher income per capita in average, lower corruption level, higher government expenditure (larger size of government) experience fewer deaths and economic damages (damages/GDP) than developing countries, although this condition might be affected with other factors such as countries geographical location.

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**Finance and Firm's Growth:
Panel Evidence from Selected OPEC Members**

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The roles of finance on economic growth have been examined extensively at macro level. In general, findings emphasized on the significant role of finance in generating long-run economic growth. However, little attention has been given to investigate the role of finance at micro level, particularly the role of internal and external finance upon firms' growth. Most of the previous studies focused on the developed countries database. However, the current study concentrated on the financial development and firms' growth in Organization of Petroleum Exporting Countries (OPEC) as the developing countries. OPEC members have different economic atmosphere that is oil-oriented and having high GDP per capita but low degree of financial development is the common feature of them. This study aims to investigate the role of financial development and other important factors on firm growth. The GMM is employed for sample of four OPEC members (Saudi Arabia, UAE, Qatar and Kuwait) during 2000-2011. The paper findings represent positive effect of internal finance using elevating cash flow but the negative impact of external finance by means of leveraging on the firms' growth. Moreover, firms' growth is accelerated by reducing the cost of doing business in such countries.

Key Words: Access to Financing; Firm Growth; Financial Constraint

JEL Classification: G00; G30

1. Introduction

Identification of the most influential factors on firm growth and local-regional features that effect on such issue are still in the core of financial debates. How firms can move toward the alternative sources of finance depends very much on the level of financial development of the countries in which the firms are located (Rajan 1998, Demirguc-Kunt 1998, Beck

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2005b, a, Aghion 2007). The role of finance in economic growth has been examined extensively, and findings revealed the significant function of finance in generating the long-run economic growth. Previous literature in this regard could generally be classified into two strands. The first one focused on the relationship between finance and growth at the macro level, and mostly narrowed on the developed countries database. A number of studies as far back as Schumpete (1911), Hicks (1969), Goldsmith (1969), McKinnon (1973), Gurley(1973), among others, emphasized the positive influence of the development of the financial sector on economic growth. Demirguc-Kunt (1998) and Beck (2005a) state that financial development eases the obstacles that firms face and helps them to grow faster and it improves macroeconomic performance. The second strand of research that is related to investigate the role of finance at the micro level². Financial development facilitates new sources of external finance (e.g. leveraging from the debt market or issuing more shares) for firms and could affect firms' growth. While Brito and Mello (1995) and Beck (2006), among others, state that the relationship between external finance and firms' growth is direct, Jensen (1976) Stulz (1990a), Demirguc-Kunt (1998), Beck (2005b), and Aghion (2007) disagree on this role and emphasize that there is no direct effect between external finance and firm's growth.

Most of the studies that investigated the finance-growth nexus have focused on the macro level study; and in particular have used the developed countries database. In general, most of them have concluded that financial development has a positive effect on economic growth. However, little attention has been given to examine finance-growth nexus at firm-level data. The notable point of the present study is focusing on the financial development and firm growth within a group of net oil exporting countries so-called OPEC. Such countries have a different economic and financial structure that urges policy makers and academicians to consider these countries. The economies of OPEC members have heavily relied on the exports of oil, where the revenue from the production of oil and gas stands for a very significant portion of their GDP. The OPEC community is now considering reducing the dependency on oil and petroleum products and on moving the economy toward the more diversified activities where other sectors of the economy could significantly contribute in economic growth (The Economist, 2010). For

² See, Brito and Mello (1995), Beck (2006)

example, the developments of the financial markets are seen as the foundation of diversification program in OPEC and are closely associated with the objective of diversifying economic activity (Kern 2010; Oxford Economics 2013). Development of financial markets results in the firm's more access to internal and external financial resources. The firms' decision about their financial structure (i.e. decision over the internal and external sources of their finance) is closely associated with how developed the financial markets that the firms face to. Firms have more access to the external finance in more developed economics, while in the financially less developed economies the firms should rely mainly on their internal sources (such as cash flow or level of depreciation in balance sheet). While studying the effect of financial development and the impact of internal and external financial resources on firm growth has drawn a lot of attention in recent years, there has not been a consensus among the academicians as well as practitioners on their findings (Demirgüç-Kunt and Maksimovic 2002). Therefore, analyzing and examining the extent to which internal and external finances are stimuli to firm growth is the prime motivation of this study. Further, the heterogeneous impacts of such internal and external financing on firms within different countries and industries are yet to be investigated that is another objective of current study. Moreover, most of the OPEC members including Saudi Arabia, UAE, Kuwait, Qatar, and Iran are corporations of international compliance with global regulatory and supranational cooperation which requires them to restructure their regulatory environment and also liberalize their financial markets (IMF). Regulatory framework in OPEC countries, the business environment that each firm faces in such countries and the extent to which firms could operate their business activities are stringent barriers for firms in OPEC countries as compared to the world on average. Business environment shows the ability to start business and opportunity for growth in a given economy. To author best knowledge, the literature gaps in investigating the impact of the business regulatory barriers on the firm's growth. It is not clear to what extent the liberalization of the regulatory environment could impact on the firm's growth. Another contribution of present study is investigating the impact of finance on firm growth while controlling business environment.

Overall, this study aims to examine the effect of internal and external sources of finances as well as the effect of business environment on firm's growth in selected OPEC countries (Qatar, Saudi Arabia, Kuwait and United Arab Emirate) capturing the heterogeneity effects of size on firm

growth. For this purpose, the recent econometric technique namely the Generalize Method of Moments Estimator (GMM) is employed.

2. Stylized Facts about the OPEC Members

OPEC comprises 12 members including Iran, Iraq, Kuwait, Saudi Arabia, Venezuela, Qatar, Gabon Libya, the United Arab Emirates, Algeria, Nigeria, and Ecuador. Among the 12 members of OPEC community, Qatar, Saudi Arabia, Kuwait and United Arab Emirate have demonstrated the highest value of GDP and oil export per capita (Based on World Development Indicators). Over the period of 2000 to 2011, firms within OPEC community have achieved very high growth rates in terms of total assets. The firms average assets growth was 14 percent, per annual within the period of 2000 to 2011 as shown in Table 1. However, the rate of growth varies between countries, where Qatari's followed by UAE's firms demonstrated the highest growth rates.

Table 1: Firm growth indicators in selected OPEC members (2000-2011)
(growth rate, %)

Countries	Indicator	Firms at aggregate level
Kuwait	Total asset	12.4
Saudi Arabia	Total asset	10.9
Qatar	Total asset	24
UAE	Total asset	18.3
Selected OPEC	Total asset	14

Source: Thompson Financial DataStream (2012)

*Non- Financial Listed companies are included.

Table 2 indicates the growth of cash flow and leverage variable for non-financial listed firms for the selected OPEC countries.

Table 2: Performance indicators of firms in selected OPEC (2000-2011)
(growth rate)

Country	Indicators (%)	Firms
Kuwait	Cash flow	4.8
	Leverage	7.9
Saudi Arabia	Cash flow	13.3
	Leverage	2
Qatar	Cash flow	7.8
	Leverage	13.5
UAE	Cash flow	12.4
	Leverage	5.8
Selected OPEC	Cash flow	9.4
	Leverage	6.1

Source: Thompson Financial DataStream (2012)

*Non- Financial Listed companies are included.

Having taken into consideration the difference between the levels of financial development of the related countries, it requires to investigate the linkages between economic growth and financial constraints. Considering the ratio of domestic credit plus stock market capitalization to GDP, as an indicator of financial development, OPEC countries have shown less developed financial markets 102%, compared to the world on average 233%. However, within the selected OPEC countries Kuwait followed by Qatar demonstrated to have the more developed financial markets than the other two countries (See Table 3).

Table 3: The ratio of domestic credit plus stock market capitalization to GDP in Selected OPEC countries and the world on average

Country	2007	2008	2009	2010	2011
Qatar	56	111	140	167	142
Kuwait	100	135	169	162	107
UAE	36	98	119	127	107
Saudi Arabia	59	92	137	78	55
Selected OPEC	62	109	141	133	102
The World in aggregate	230	186	221	255	233

Source: Word Development Indicator, Word Bank (2012)

There is no consensus of view on the linkage between company financing and the firm's growth. Are these two features related? And if so, what is the nature of the link that connects them? Investigating such issues constitutes the motivations of this paper.

3. Methodology and Data

In order to study the impact of financial development on the firm growth the following model represented by equation 1 is developed.

$$g_{it} = \beta_0 + \beta_1 g_{it-1} + \beta_2 \left(\frac{CF}{A} \right)_{it} + \beta_3 LE_{it} + \beta_4 Q_{it} + \beta_5 Age_{it} + \beta_6 CODB_{jt} + \beta_7 EG_{it} + \sum_{j=1}^3 \beta_{7+j} CSC_j + \sum_{k=1}^2 \beta_{10+k} ISC_k + \gamma_i + \varepsilon_{it} \quad \text{Eq.1}$$

In Eq.1 the dependent variable is the firm growth (g_{it}) which is calculated as follows:

$$g_{it} = d \ln(A_{it}) \quad \text{Eq.2}$$

Referring to A_{it} as firms' total assets, this study utilizes the lagged values of the dependent variable g_{it-1} as a predetermined explanatory variable. (CF/A) as an indicator of internal finance is the ratio of cash flow over total asset. Leverage (LE) is the ratio of long-term debt to total asset. Tobin's Q has been a ratio of market capitalization to booking value of total equity. Age refers to firms' age. CODB as an indicator for business environments is an index of 10 factors. EG denotes the economic growth. CSC and ISC are country (Qatar, Saudi Arabia and UAE) and industry (primary, secondary, tertiary) dummies, respectively. γ refers to the firm's fixed effects, and ε is a random disturbance. There are two fundamental concerns regarding to Eq.1, which are fixed effects and possible endogeneity problem for obtaining consistent estimators. Regarding to the first problem, Arellano and Bond (1991) suggested removing fixed effects by transforming the model. This transformation can be done by means of taking the first difference or orthogonal deviation. The orthogonal deviation has an advantage in unbalanced panel because it can consider missing data and sample size as well. The generalized method of moments (GMM) is adopted to estimate Eq.1 which has been developed for a dynamic panel by (Holtz-Eakin, 1988; Arellano & Bond, 1991; Arellano & Bover 1995). This estimator would be controlling for unobserved firm-specific fixed effects and endogeneity.

The employed instruments depend on the assumption that has been made whether or not the variables are endogenous, exogenous or predetermined.

The structure of the employed dataset allows using panel data methodology for proposed research. Since the number of cross sections in the collected dataset is far higher than the number of time series observations, then the structure of panel will be so-called “small T, large N” (Arellano & Bond, 1991). Further, model specification has a linear functional form where the dependent variable (firms’ growth) is explained by its own lag. Such modeling structure suggests the use of General Method of Moment (GMM) technique developed and extended by Holtz-Eakin (1988), Arellano and Bond (1991), Arellano and Bover (1995). The Arellano-Bover (1995)/Blundell-Bond (1998) estimator that is employed assumes uses of the first differences of instrumenting variables which is uncorrelated with the fixed effects. This is an important improvement of the original Arellano-Bond model since it allows the introduction of more instruments. Moreover, the methodology offers forward orthogonal deviations, as an alternative to differentiation. The advantage with forward orthogonal deviations is that it preserves sample size in our unbalanced sample which includes a gap. In this paper we employ the asymptotically more efficient two-step system GMM estimator augmented with a finite-sample correction to the two-step covariance matrix derived by Windmeijer (2005) in order to correct downward biased standard errors. The GMM-estimator should correct simultaneity bias coming from the endogeneity of variables and the presence of correlated firm-specific effects. GMM analysis enables us to control firm heterogeneity, and also to reduce collinearity between the variables that have been contemplated (Arellano & Bond 1991). Also, this technique would enable us to eradicate the biases which are potential in the estimates of results regarding correlation between the two of the unobservable individual effects and also the explanatory variables.

4. Results and Discussions

The estimated results for non-financial listed firms in the four OPEC members (Saudi Arabia, Kuwait, Qatar, UAE) over the period of 2000-2011 are shown in table 4. Column 1 in Table 4 shows the impact of the independent variables including the lagged form of cash flow, Tobin’s Q, leverage, cost of doing business, economic growth, age, dummy variables

indicating primary and secondary and tertiary industries, then dummy variables for countries on the firms' growth. It should be noted that in the first column, the interaction of explanatory variables with each of dummy variables are not included in the right hand side variables. Similar to column 1, in column 2, the impact of the right hand side variable on firm growth is investigated. However, in this column, the interactions of explanatory variables with industry dummy variables are included in the model while the country and industry dummy variables are not included in the model due to VIF results. Compared to column 2, in column 3, the interaction of explanatory variables with country dummy variables is included in the model while the interaction of variables with industry dummy variables is removed. In Column 4, the impact of the right hand side variables including the lagged dependent variables (Lagged firm growth), cash flow, Tobin's Q, leverage, cost of doing business, economic growth, age, the interaction of explanatory variables with country dummy variables, and the interaction of explanatory variables with industry dummy variables are entered into the model. Furthermore, by using VIF analysis, those interaction variables that caused collinearity problem are removed from the right hand side. Column 5 is the same as column 4 except that those non-significant interactions which are removed from the analysis step by step start from the most insignificant coefficient. It should be noted that the values of coefficients shown in Column 5 are used to interpret the results. The value of coefficient in Column 4 is not for interpretation of result but it is used as a step to choose the right hand side variables that should be used in Column 5. Further, one should look at the value of coefficients in column 1 through 3 to check for the robustness of results in Column 5. Considering column 5 of Table 4, the result shows that the lagged dependent variable is significant in all models which justify the use of dynamic model. Moreover, the significant coefficient of LDV in Columns 1 to 3 also shows that the result is robust regardless of the inclusion of new information, namely interactive variables.

Consistent with the theory, the coefficient of LDV is positive (0.069), indicating that the firm growth of the last year is stimulus to growth in the current year. Cash flow to total asset is also significantly positive with the value of 1.279 which indicates the influences of internal finance. Particularly, increase in cash flow as it is expected increases the firm growth in all columns. Additionally, its interaction with UAE (-0.521), Saudi Arabia (-0.573), and Qatar (-0.630) is also significant which

indicates the country-specific heterogeneities regarding internal financing. Leverage as an external source of financing from debt markets is significant and negative in all scenarios demonstrating the robustness of the results with the value of -0.154 in Column 5. Its interaction with UAE (0.120), Saudi Arabia (0.156), and Qatar (0.168) is also significant which indicates the country-specific heterogeneities regarding external financing from debt market. Thus, higher leverage has different influences on countries as UAE suffers but Saudi Arabia and Qatar benefit. The findings are consistent with previous studies as they have found that leverage could have a positive (Demirguc-Kunt and Maksimovic (1998), Beck, Demirguc-Kunt and Maksimovic (2005) Aghion, Fally and Scarpetta (2007)) or negative impact (Lang et al (1996), Aivazian et al. (2005), Firth et al. (2008)). The coefficient of “the market cap over installation cost” also known as Tobins’ Q requires more attention. While Tobins’ Q is significantly positive in the base model, it is insignificant in Column 5 after including interactions. Particularly, its interaction with Qatar (0.037) and secondary industry (0.011) is significant, which highlights country- and industry-level heterogeneities. In general, the findings highlighted the significant impact of financing on firms’ growth, though the influence varies across countries. Firms in Qatar can benefit from all sources of financing, while UAE and Saudi Arabia could only benefit from internal financing.

Cost of doing business as an environmental variable is not significant at 10 percent in the base model, but it is significant at 1 percent in the final model (-0.001) after including a dummy interactive variable for Qatar (-0.004) which is also significant at 1 percent. As expected, the coefficient of CODB is negative which indicates reducing cost of doing business; hence improving business environments increases firms’ total asset growth (Beck 2006). Age is not significant in either base model or final one (Gelancey, 1998; Davidsson, 2002), but its interaction with Qatar (-0.002) is significant at 1 percent. Therefore, older firms generally do not significantly suffer from lower growth; however, they would be exposed to lower growth in Qatar which might be due to better business environments and access to various sources of financing. As another country-specific variable, economic growth (0.003) is significant at 1 percent without any interactions in the final model. It indicates that better economic and country-specific conditions lead to firms’ higher growth in all the selected countries of the sample. The diagnostic tests indicate that

the estimated model is valid. Particularly, 151 instruments have dealt with endogeneity problem as Hansen test is 0.406 and AR (2) is 0.825. Moreover, the number of groups (216) outnumbers instruments.

Table 4: The Determinants of Firms' Asset Growth: System GMM Results

	1 (Base)	2 (Industry)	3 (Country)	4 (Final-VIF)	5 (Final-VIF-Step)
Firm's growth $_{i,t-1}$	0.067*** (0.025)	0.070*** (0.025)	0.052** (0.025)	0.061** (0.026)	0.069*** (0.025)
Cash flow/ total asset $_{i,t}$	1.216*** (0.083)	1.334*** (0.120)	1.303*** (0.113)	1.286*** (0.138)	1.279*** (0.107)
Tobins' Q $_{i,t}$	0.012*** (0.004)	0.013 (0.009)	0.011** (0.005)	0.012 (0.009)	0.005 (0.005)
Leverage $_{i,t}$	-0.195*** (0.057)	-0.198*** (0.071)	-0.161*** (0.057)	-0.141** (0.065)	-0.154*** (0.052)
Cost of Doing Business $_{i,t}$	-0.001 (4.226x10 ⁻⁰⁴)	9.930x10 ⁻⁰⁵ (2.629x10 ⁻⁰⁴)	-0.001*** (3.742x10 ⁻⁰⁴)	-0.001 (4.061x10 ⁻⁰⁴)	-0.001*** (3.304x10 ⁻⁰⁴)
Economic Growth $_{i,t}$	0.003*** (0.001)	0.003*** (0.001)	0.003*** (0.001)	0.004*** (0.001)	0.003*** (0.001)
Age $_{i,t}$	-2.294x10 ⁻⁰⁴ (3.694x10 ⁻⁰⁴)	-2.312x10 ⁻⁰⁴ (0.001)	-2.388x10 ⁻⁰⁴ (4.540x10 ⁻⁰⁴)	-3.252x10 ⁻⁰⁴ (0.001)	-2.175x10 ⁻⁰⁴ (3.401x10 ⁻⁰⁴)
IND1: Dummy Variable for Primary industries	-0.015 (0.014)	-	-	-	-
IND2: Dummy Variable for Secondary industries	0.032*** (0.012)	-	-	-	-
UAE	0.045** (0.022)	-	-	-	-
Saudi Arabia	0.052 (0.032)	-	-	-	-
Qatar	0.019 (0.023)	-	-	-	-
Cash flow/ total asset $_{i,t}$ * UAE	-	-	-0.504** (0.230)	-0.301 (0.236)	-0.521** (0.259)
Cash flow/ total asset $_{i,t}$ * Saudi Arabia	-	-	-0.633*** (0.136)	-0.453*** (0.158)	-0.573*** (0.145)
Cash flow/ total asset $_{i,t}$ * Qatar	-	-	-0.628*** (0.220)	-0.584** (0.267)	-0.630*** (0.213)
Cash flow/ total asset $_{i,t}$ * IND1	-	-0.404*** (0.155)	-	-0.108 (0.185)	-
Cash flow/ total asset $_{i,t}$ * IND2	-	-0.475*** (0.164)	-	-0.190 (0.168)	-
Tobins' Q $_{i,t}$ * UAE	-	-	-0.003 (0.006)	-0.008 (0.006)	-
Tobins' Q $_{i,t}$ * Saudi Arabia	-	-	-	-	-
Tobins' Q $_{i,t}$ * Qatar	-	-	0.040*** (0.010)	0.031 (0.019)	0.037*** (0.011)
Tobins' Q $_{i,t}$ * IND1	-	-0.008 (0.011)	-	-0.008 (0.010)	-
Tobins' Q $_{i,t}$ * IND2	-	0.003 (0.010)	-	0.005 (0.009)	0.011*** (0.004)
Leverage $_{i,t}$ * UAE	-	-	0.166** (0.080)	0.145** (0.076)	0.120*** (0.042)
Leverage $_{i,t}$ * Saudi Arabia	-	-	0.171*** (0.064)	0.179*** (0.063)	0.156*** (0.060)

Leverage _{<i>i,t</i>} * <i>Qatar</i>	-	-	0.152*** (0.053)	0.150* (0.080)	0.168*** (0.051)
Leverage _{<i>i,t</i>} * <i>IND1</i>	-	0.170*** (0.066)	-	0.002 (0.062)	-
Leverage _{<i>i,t</i>} * <i>IND2</i>	-	0.094 (0.064)	-	-0.004 (0.057)	-
Cost of Doing Business _{<i>i,t</i>} * <i>UAE</i>	-		-1.879x10 ⁻⁰⁴ (0.001)	2.233x10 ⁻⁰⁴ (0.001)	-
Cost of Doing Business _{<i>i,t</i>} * <i>Saudi Arabia</i>	-	-	-	-	-
Cost of Doing Business _{<i>i,t</i>} * <i>Qatar</i>	-	-	-0.004*** (0.001)	-0.003** (0.002)	-0.004*** (0.001)
Cost of Doing Business _{<i>i,t</i>} * <i>IND1</i>	-	-0.001 (3.996x10 ⁻⁰⁴)	-	-4.905x10 ⁻⁰⁴ (4.134x10 ⁻⁰⁴)	-
Cost of Doing Business _{<i>i,t</i>} * <i>IND2</i>	-	-1.140x10 ⁻⁰⁴ (3.545x10 ⁻⁰⁴)	-	-1.500x10 ⁻⁰⁴ (3.828x10 ⁻⁰⁴)	-
Economic Growth*UAE	-	-	-0.006*** (0.002)	-0.006*** (0.002)	-
Economic Growth* Saudi Arabia	-	-	-0.003 (0.002)	-0.002 (0.002)	-
Economic Growth* Qatar	-	-	-	-	-
Economic Growth*IND1	-	-0.003 (0.002)	-	-0.002 (0.002)	-
Economic Growth* IND2	-	0.001 (0.002)	-	3.657x10 ⁻⁰⁴ (0.002)	-
Age*UAE	-	-	3.126x10 ⁻⁰⁴ (0.001)	1.490x10 ⁻⁰⁵ (0.001)	-
Age*Saudi Arabia	-	-	4.759x10 ⁻⁰⁴ (0.001)	-2.010x10 ⁻⁰⁴ (0.001)	-
Age*Qatar	-	-	-0.002*** (0.001)	-0.002*** (0.001)	-0.002*** (0.001)
Age*IND1	-	-0.001 (0.001)	-	0.001 (0.001)	-
Age*IND2	-	-4.466x10 ⁻⁰⁴ (0.001)	-	2.766x10 ⁻⁰⁴ (0.001)	-
UAE*IND1	-	-	-	-	-
Saudi Arabia*IND1	-	-	-	-	-
Qatar*IND1	-	-	-	-	-
UAE*IND2	-	-	-	-	-
Saudi Arabia*IND2	-	-	-	-	-
Qatar*IND2	-	-	-	-	-
Constant	0.101*** (0.028)	0.096*** (0.025)	0.096*** (0.026)	0.081*** (0.024)	0.094*** (0.024)
Number of Instruments:	146	153	156	168	151
Number of Groups:	216	216	216	216	216
AR(1)	0.000	0.000	0.000	0.000	0.000
AR (2)	0.936	0.988	0.985	0.851	0.825
Hansen test	0.512	0.591	0.342	0.325	0.406

* Significance at the 10% level.

** Significance at the 5% level.

*** Significance at the 1% level.

7. Conclusion and Policy Implications

The importance of finance on economic growth has been extensively pointed out by various researchers using macro level study. In general, findings have supported the finance-led growth hypothesis in which more finance is associated with more growth in the long run. However, little attention has been given to investigating the role of finance at firm level, particularly the role of internal and external finance upon firm's growth for the case of Organization of Petroleum Exporting Countries (OPEC). Thus, this paper contributes to the empirical debates on the literature of finance-growth nexus by analyzing the impact of finance on firms' growth in OPEC members, using a comprehensive and robust model which considers various business environments and possible sources of heterogeneities. The justifications for the selection of firms in the selected OPEC members (Saudi Arabia, United Arab Emirates, Kuwait and Qatar) can be explained with three reasons as follow; high GDP per capita relative to world, low financial development and a highly dependent economy on oil revenue. In fact, these countries are fast-growing with high GDP per capita and still have great potentials in boosting firms' growth and stock markets, in which they can attract financial resources and investors, and subsequently can improve the level of financial development. Therefore, the aim of this paper has three aspects. First, this study examines the impact of financial variables such as cash flow, leverage and stock market on firm's growth. Second, this study assesses the impact of business environments on firm growth. Third, this study explores the heterogeneity effects of country and industry specific variables on the firm growth in the selected OPEC members (Qatar, Saudi Arabia, Kuwait, and United Arab Emirate) during 2000-2011. The baseline model of the determinants of the firm growth has been estimated using General Method of Moment (GMM) method. Several interesting findings are emerged from this study:

i) Our finding suggests that internal finance (such as cash flow) positively affects the firm growth, implying that for the financially constrained firms the ability to generate high cash flow streams may play a significant role in financing their spectacular growth rates. Since cash flow ratio increases the firm growth, policies which enhance the firms' cash flow could lead to firm growth. High cash flow would result from Just-In-Time (JIT) manufacturing, less dividend payment, considering the higher depreciation rate, buying the inputs by credit while pre-selling the

outputs, decreasing the amount of receivables, and other methods of managing our financial resources.

ii) The coefficient of Tobin's Q is significant when this variable interacts with secondary industry dummy as well as when it interacts with the dummy variable for Qatar. In other words, in secondary industries and/ or in Qatar, firms characterized by high market capitalization to installation cost display high growth, suggesting that developing stock market (such as easing the process of foreign portfolio investment, promoting the new means of finance, decreasing transaction costs in capital market, decreasing interest rate, and empowering the financial institutions and so forth) may be key in explaining how firms are enabled to grow in secondary industries of all countries and in all industries in Qatar. Firms are also suggested to raise equity capital by issuing new shares because financing through stock market exposes firms to higher growth.

iii) The coefficient associated with the leverage variable (long-term debt to total asset) is negative and precisely determined for all scenarios indicating that firms characterized by high leverage ratio display low growth. However, its interaction with countries is positive and significant indicating that only UAE suffers from this source of financing. Therefore, a proper tax must be imposed on the financial cost.

iv) The impact of cost of doing business on firm growth is significantly negative. Such finding suggests that easing the regulatory environment enhances the degree of competitiveness among the firms in a given industry, and thus increases the firm growth. Therefore, regulators and policy makers in both government and parliament can help firms by reducing the cost of doing business.

v) Moreover, the coefficient of economic growth has always a positive coefficient, which is statistically significant for all firms suggesting that policies which stimulate the overall demand in economy encourage the growth of firms.

vi) The significant interactive variables imply heterogeneities across countries and industries. For example, the variable of age is insignificant, but its interaction with the country dummy is significant. To give another example, the coefficient of Tobin's Q is significant only when this

variable interacts with secondary industry dummy as well as when it interacts with the dummy variable for Qatar. Such results indicate that in order to promote the firm growth in OPEC members one should consider the heterogeneity impact of similar policies. Furthermore, a model excluding the interactive variable would disregard any relationship between variables of interest and firm's growth, while it is an inaccurate conclusion. Future studies might dismantle the total asset into fixed and non-fixed assets as indicators of firms' growth in order to find out the impact of leverage on each of them. This is because the leverage might have a different impact on fixed and non-fixed assets. Further, the future studies are warranted to break down the cost of doing business indicator and estimate the impact of those indicators on firms' growth.

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Appendix A:

Firm's Growth (g_{it}): Total asset is used to measure firms' growth calculated as: $g_{it} = \Delta(\ln(A_t))$ where A refers to total asset. This measured is used in the study of Rahaman (2011). Moreover, following Rahaman (2011) this study uses the lagged value of dependent variable (g_{it-1}) as a predetermined explanatory variable.

Cash Flow ratio (CF/A): The ratio of cash flow (net income plus depreciation) over total asset (the sum of the firm's fixed and current assets, where fixed assets include tangible fixed assets, intangible fixed assets, and other fixed assets; and current assets include inventories, accounts receivable, and other current assets). The ratio of cash flow over total asset is represented as an indicator of Internal Finance

Leverage (TL/A): Financial leverage (LE) which is an indicator of external finance is the ratio of total liability (TL) over total asset (A). Total liabilities is defined as the sum of current liabilities and non-current liabilities, where current liabilities include bank loans, accounts payable, and other current liabilities; and non-current liabilities include long-term debt and other non-current liabilities.

Tobin's Q: Tobin's Q as an indicator of external finance is measured as the ratio of market capitalization to book the value of total equity.

Age: The number of years since the company has initiated his business activity.

Cost of Doing Business: Cost of Doing Business (CODB) is an indicator of ease of doing business which ranks economies from 1 to 185, with the first place being the best. The index averages the countries percentile ranking over 10 topics covered I the World Bank's Doing Business. The ranking on each topic is the simple average of the percentile rankings on its component indicators.

Niche Marketing of Date Palm based Food and Beverages as Health Products

Mohammed Jamshed¹ and Shamim Ahmad²

A ‘Target Marketing’ approach may be suitable for achieving a competitive edge by date palm sellers and overcoming the difficulties like seasonality, high volumes, intense competition, and income stagnancy. Michael Porter’s Diamond Model has been applied to check the capacity and dependency of date palm producing countries on different determinants in the process of getting a competitive edge. The results confirm the need of product diversification and target marketing approach. Offering innovative premium products to the quality conscious segments and developing new date-based minimally processed foods, processed culinary ingredients and ready-to-consume processed foods and beverages as substitutes to unhealthy ultra-processed products will benefit the marketers and the consumers both. Producing value-added premium products and adopting appropriate marketing methods with promotional campaigns will lead to healthy food habits and also stimulate preferences for these items. A coordinated effort will give the date industry a sustainable growth and the people a healthy life.

Keywords: Date Palm Marketing, Niche Marketing, International Target Marketing, Value Marketing, Value Addition in Date Industries, Health Foods

JEL Classification: Q13, M31, L66, P36, P32, P33

The world has turned very competitive. To gain and maintain a sustainable competitive edge is the success formula for individuals, business units and the nations alike in all the economic pursuits. Using

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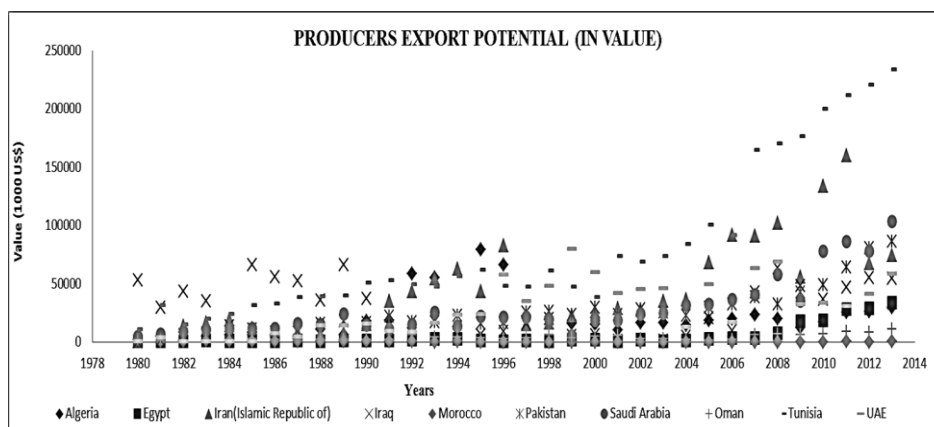
the date palm resources by the producing countries for achieving their economic prosperity also requires following the same route. The nations bestowed with date palm have to evaluate their potential and evolve a strategy for better performance.

1. Current Status of Dates Palm

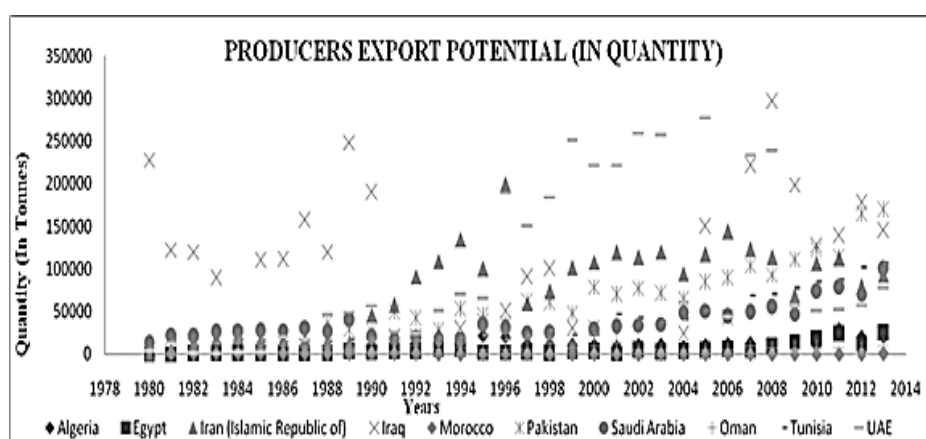
Presently, the major varieties of date palm fruits are uniformly supplied by producers of different countries on highly competitive prices. The date palm fruits are sold in large quantities domestically and exported internationally to raise revenues and achieve higher targets by meeting the global demands. Exporting opportunities and the involved low risk perceptions have resulted in higher commitment to exports (Rashidi 2013). The research by Marshudi (2002) for traditional date palms of Oman has revealed the quality issues in dates' production causing low return to the producers.

Graph 1 shows the value of annual exports of the major date exporting countries which if we compare with Graph 2 (that gives the annual export quantities of the same set of countries) indicates a difference in their positions. Date fruit varieties and their values differ significantly. Countries on top in values of export in recent years i.e. Tunisia and Saudi Arabia are not the ones who top in quantities i.e. Pakistan and Iraq. (See Graphs 1 & 2).

Variance analysis has been done by Kahtani (2007) indicating significant difference in prices, varieties and the marketing margins therein and the expected demand to increase with the population growth. Liu (2003) reported scope for increased imports of *deglet nour* and *Mejool* dates in Europe provided that the logistic constraints were overcome and superior quality, proper packaging and easy traceability ensured. The study also found no possibility of significant rise in price from the present level.



Graph 1: Value of Annual Exports of Dates by Different countries (Drawn from FAO August, 2016)



Graph 2: Quantity of Annual Exports of Dates by Different countries (Drawn from FAO August, 2016)

In an effort to standardize the quality norms, Abdoulhadi (2011) outlined four texture parameters viz, hardness, springiness, cohesiveness and resilience of Saudi Arabian date cultivars i.e. *Khalas*, *Sheshi* and *Reziz*. This is essential for protecting the identity of the cultivars and strengthening the quality grade norms in major varieties to boost the export of dates. Seasonality, perishability, quality standards, packaging and logistics are the major areas of concern apart from the demand limitations for the date palm industry. There is a negligible share of value-added date palm based products in the total market. Moreover, the sector

lacks a focus on arrangements for quality, market assessment, target marketing, product development, infrastructure and strategies for marketing value added products.

2. Problem Statement

A number of researches have pointed out the detrimental effect of inter-firm competition in dates (e.g., Villas-Boas 1999, Chen et al. 2001). FAO working paper on commodity and trade policy research has indicated stagnation in EU imports of date palm fruits and a decline in its prices since 1996 (Liu 2003). The possibility of utilising consumer surplus to attain a competitive edge by date producers needs attention (Wathieu 2002). To increase the value of exports, the date palm industry in fact needs new date products (Liu 2003). Substandard or mixed-up varieties fetch in lower prices and therefore research and development is needed to modernize and upgrade the products, especially the established varieties like *Medjool*, *Barhee Khalas*, *Abu Naringa*, *Barni*, *Madlouki* and *Faradh* (Mbaga et al. 2011). The study also finds the scope of developing alternative uses of date palm resources for offering food ingredients, semi-processed and ultra-processed food and beverages (Mbaga et al. 2011). Developing and marketing of organic or health products out of date palm has received less attention of the producers (Mahmoudi et al. 2008).

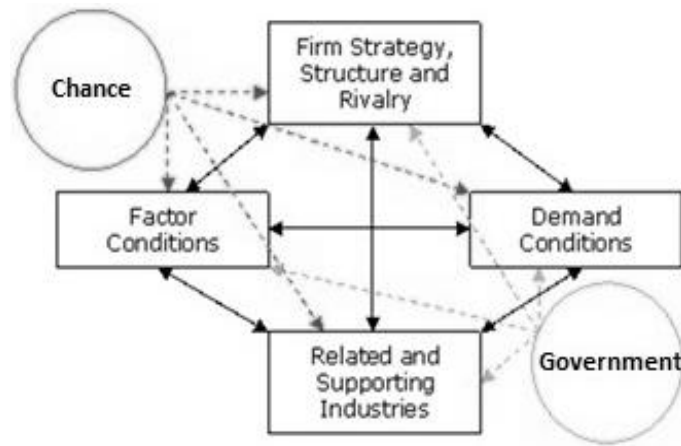
Under the given circumstances, the present study outlines the following objectives:

- a) To evaluate the competitive strength of nations in dates' exports
- b) To identify the potential problem areas of the top date palm product exporting countries
- c) To analyse the fitness of date-based products as alternatives to ongoing food, beverages and health products
- d) To match the global demand of food, beverages and health products with date-based products to judge their potential
- e) To explore the possibilities of launching dates in different verticals such as minimally processed foods, processed culinary ingredients and ready-to-consume processed foods and beverages.

3. Michael Porter's Diamond Model

Analysing the whole scenario in the framework of Michael Porter's Diamond Model of Competitive Advantage of Nations guides the date palm producers in the wake of global competition. According to Porter's approach the determinants of competitive advantage of nation are four interlinked factors i.e. Factor Conditions, Demand Conditions, Related and Supporting Industries and Company Strategy, Structure & Rivalry. He adds two more factors, namely Government Policy and Chance (exogenous shocks) to make it a 'Diamond Model'. Porter has elaborated the role of these factors in his pioneering work (Porter 1990). We hereby used this framework (using first four factors only) in explaining the determinants of the competitive advantage of date palm as enjoyed by date producing nations. Using the FAO database, we have drawn proxy inputs for the model factors which appear to be closer to Porter descriptions in the context of date palm. The results have then been discussed and interpreted.

Figure 1: Porter's Diamond Model of Competitive Advantage



Model Formulation: Value of dates exports from Country A = $f \{A's \text{ factor condition (production 'P' + harvest area 'H') + demand condition (DC) (total value of world dates imports) + related and supporting industries (DQ) (total quantity of dates of country A's industries) + firm strategy, structure, and rivalry (DX) (export of competitive countries)}\}$

Adopting this model in econometric terms is as under;

$$DX_A = \alpha_{0A} + \beta_{1A}H_A + \beta_{2A}P_A + \beta_{3A}DC_w + \beta_{4A}DQ_A + \beta_{5A}DX_E + \beta_{6A}DX_{In} + \beta_{7A}DX_{Ir} + \beta_{8A}DX_M + \beta_{9A}DX_P + \beta_{10A}DX_S + \beta_{11A}DX_O + \beta_{12A}DX_T + \beta_{13A}DX_U + \varepsilon \quad (1)$$

$$DX_E = \alpha_{0E} + \beta_{1E}H_E + \beta_{2E}P_E + \beta_{3E}DC_w + \beta_{4E}DQ_E + \beta_{5E}DX_A + \beta_{6E}DX_{In} + \beta_{7E}DX_{Ir} + \beta_{8E}DX_M + \beta_{9E}DX_P + \beta_{10E}DX_S + \beta_{11E}DX_O + \beta_{12E}DX_T + \beta_{13E}DX_U + \varepsilon \quad (2)$$

$$DX_{In} = \alpha_{0In} + \beta_{1In}H_{In} + \beta_{2In}P_{In} + \beta_{3In}DC_w + \beta_{4In}DQ_{In} + \beta_{5In}DX_A + \beta_{6In}DX_E + \beta_{7In}DX_{Ir} + \beta_{8In}DX_M + \beta_{9In}DX_P + \beta_{10In}DX_S + \beta_{11In}DX_O + \beta_{12In}DX_T + \beta_{13In}DX_U + \varepsilon \quad (3)$$

$$DX_{Ir} = \alpha_{0Ir} + \beta_{1Ir}H_{Ir} + \beta_{2Ir}P_{Ir} + \beta_{3Ir}DC_w + \beta_{4Ir}DQ_{Ir} + \beta_{5Ir}DX_A + \beta_{6Ir}DX_E + \beta_{7Ir}DX_{In} + \beta_{8Ir}DX_M + \beta_{9Ir}DX_P + \beta_{10Ir}DX_S + \beta_{11Ir}DX_O + \beta_{12Ir}DX_T + \beta_{13Ir}DX_U + \varepsilon \quad (4)$$

$$DX_M = \alpha_{0M} + \beta_{1M}H_M + \beta_{2M}P_M + \beta_{3M}DC_w + \beta_{4M}DQ_M + \beta_{5M}DX_A + \beta_{6M}DX_E + \beta_{7M}DX_{In} + \beta_{8M}DX_{Ir} + \beta_{9M}DX_P + \beta_{10M}DX_S + \beta_{11M}DX_O + \beta_{12M}DX_T + \beta_{13M}DX_U + \varepsilon \quad (5)$$

$$DX_P = \alpha_{0P} + \beta_{1P}H_P + \beta_{2P}P_P + \beta_{3P}DC_w + \beta_{4P}DQ_P + \beta_{5P}DX_A + \beta_{6P}DX_E + \beta_{7P}DX_{In} + \beta_{8P}DX_{Ir} + \beta_{9P}DX_M + \beta_{10P}DX_S + \beta_{11P}DX_O + \beta_{12P}DX_T + \beta_{13P}DX_U + \varepsilon \quad (6)$$

$$DX_S = \alpha_{0S} + \beta_{1S}H_S + \beta_{2S}P_S + \beta_{3S}DC_w + \beta_{4S}DQ_S + \beta_{5S}DX_A + \beta_{6S}DX_E + \beta_{7S}DX_{In} + \beta_{8S}DX_{Ir} + \beta_{9S}DX_M + \beta_{10S}DX_P + \beta_{11S}DX_O + \beta_{12S}DX_T + \beta_{13S}DX_U + \varepsilon \quad (7)$$

$$DX_O = \alpha_{0O} + \beta_{1O}H_O + \beta_{2O}P_O + \beta_{3O}DC_w + \beta_{4O}DQ_O + \beta_{5O}DX_A + \beta_{6O}DX_E + \beta_{7O}DX_{In} + \beta_{8O}DX_{Ir} + \beta_{9O}DX_M + \beta_{10O}DX_P + \beta_{11O}DX_S + \beta_{12O}DX_T + \beta_{13O}DX_U + \varepsilon \quad (8)$$

$$DX_T = \alpha_{0T} + \beta_{1T}H_T + \beta_{2T}P_T + \beta_{3T}DC_w + \beta_{4T}DQ_T + \beta_{5T}DX_A + \beta_{6T}DX_E + \beta_{7T}DX_{In} + \beta_{8T}DX_{Ir} + \beta_{9T}DX_M + \beta_{10T}DX_P + \beta_{11T}DX_S + \beta_{12T}DX_O + \beta_{13T}DX_U + \varepsilon \quad (9)$$

$$DX_U = \alpha_{0U} + \beta_{1U}H_U + \beta_{2U}P_U + \beta_{3U}DC_w + \beta_{4U}DQ_U + \beta_{5U}DX_A + \beta_{6U}DX_E + \beta_{7U}DX_{In} + \beta_{8U}DX_{Ir} + \beta_{9U}DX_M + \beta_{10U}DX_P + \beta_{11U}DX_S + \beta_{12U}DX_O + \beta_{13U}DX_T + \varepsilon \quad (10)$$

Where

H	Area harvested;	P	Production;	DC_w	World Import Value
DX_A	Algeria Export Value		DQ_A	Algeria Export Quantity	
DX_E	Egypt Export Value		DQ_E	Egypt Export Quantity	
DX_{In}	Iran Export Value		DQ_{In}	Iran Export Quantity	
DX_{Ir}	Iraq Export Value		DQ_{Ir}	Iraq Export Quantity	
DX_M	Morocco Export Value		DQ_M	Morocco Export Quantity	
DX_P	Pakistan Export Value		DQ_P	Pakistan Export Quantity	
DX_S	Saudi Arabia Export Value		DQ_S	Saudi Arabia Export Quantity	
DX_O	Oman Export Value		DQ_O	Oman Export Quantity	
DX_T	Tunisia Export Value		DQ_T	Tunisia Export Quantity	
DX_U	UAE Export Value		DQ_U	UAE Export Quantity	
α_0	Intercept for country		ε	Random variable or error term	
$\beta_1, \dots, \beta_3$	Parameters of independent variables for the countries in equations (1) to (10)				

Data, Variables and Results: This study is conducted with the help of FAO database. The test is conducted by identifying four variables in Porter's Diamond Model. In the absence of supporting industries' data, we have taken quantity of export as a proxy variable to calculate the issue. In the analysis, value of dates' exports is used as dependent variable for particular country and Porter's Diamond Model four variables as independent variables.

	<i>Algeria</i>	<i>Egypt</i>	<i>Iran</i>	<i>Iraq</i>	<i>Morocco</i>	<i>Pak</i>	<i>SA</i>	<i>Oman</i>	<i>Tunisia</i>	<i>UAE</i>
α_0	31974.8	294.6	-17853.0	28372.1	-37.5	4027.0	-3502.7	-1451.5	4429.0	-6100.5
β_1	-0.8344	-0.1334	-0.1575	0.1069	-0.0031	-0.2623	-0.1359	0.1158	-1.5000	0.3593
β_2	0.0665	-0.0037	0.0316	-0.0251	0.0004	0.0219	0.0007	-0.0213	0.1499	-0.1051
β_3	0.1421	-0.0018	0.1729	-0.0624	0.0001	0.0190	0.0477	0.0027	0.1274	0.1173
β_4	3.0124	0.6707	0.4997	0.2026	0.8286	0.3859	0.6772	0.6022	1.8867	0.1943
β_5	-2.3523	0.0092	-0.1734	-0.2283	0.0020	0.0397	-0.0198	-0.0009	0.1807	0.1728
β_6	-0.1632	-0.0214	0.3407	1.6769	0.0004	0.9299	0.1634	0.1354	-0.2454	0.0902
β_7	-0.2329	0.0204	-0.0046	-0.0639	-0.0004	0.0135	0.0557	0.0030	0.0970	-0.0280
β_8	-5.6966	0.0597	8.1817	3.3533	-0.0007	0.0267	-0.0736	0.0010	0.0103	0.0188
β_9	-0.6281	0.3067	-1.5048	-0.4370	0.0020	0.4076	-4.2364	0.5178	-9.1987	-7.9070
β_{10}	0.1003	0.0054	0.4779	0.4173	-0.0013	0.0412	0.1903	-0.0125	-0.0255	0.0627
β_{11}	-2.0926	-0.0995	-0.0645	0.7120	0.0212	-0.3307	0.8624	0.0170	-0.3154	-0.3042
β_{12}	0.2395	0.0331	-0.0210	-0.0160	0.0001	-0.1153	-0.0555	0.0021	0.3303	1.8897
β_{13}	-0.0702	-0.0382	-0.3845	0.0572	-0.0009	0.0520	0.0322	0.0090	-0.1040	0.1943
R Squ.	0.9073	0.9701	0.9026	0.9045	0.9284	0.9856	0.9810	0.9734	0.9948	0.9593
F Val.	14.30	47.41	13.55	13.84	18.95	99.88	75.42	53.51	279.26	34.46
Sig.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Eq. No.	1	2	3	4	5	6	7	8	9	10

The result finds R square higher than 90% which means changes in dependent variables are explained by independent variables. The negative value of β_1 reflects that harvested area is not utilized to give a positive shift in country's export. Due to high domestic consumption β_2 of Egypt, Iraq, Oman and UAE show negative effect on date exports. Further, due to high domestic consumption, Egypt and Iraq are not affected by the world demand. Iran, Algeria, Tunisia, UAE and Saudi Arabia are significantly dependent on world export. It reflects the dependence of larger part of date producing countries on the global demand of dates. The support of related and service providing industries is higher in Algeria and Tunisia while Iraq and UAE need more such support to increase their total exports. The countries impacted negatively by the other exporting countries shows relative competencies. They may be the competitors in the same market segments. Among other countries, Morocco gives highly negative impact on date export of Algeria. Therefore, Morocco stands significantly negative for the Algerian date export whereas Iran and Iraq appear giving positive support to each other in export. Egypt export activity causes a positive effect in the export of Iraq and Pakistan. Morocco impacts significantly negative on the exports of Saudi Arabia, Tunisia and UAE. While date exports of Oman play supportive role in the market creation effort by UAE.

These relationships indicate complementary, substitutional or independent role in their export product-mix. It implies that whatever be the attractiveness in an offer, everyone should not attempt to give the same thing to the same market segment. It loses the competitive edge of the producer. They should diversify and find a loyal market for themselves distinctively.

The analysis result (in table above) entails that countries need to plan their harvesting area and production activities in terms of market demand. The producers are catering to a huge market but there is a need to focus on more demanding segments of the world market.

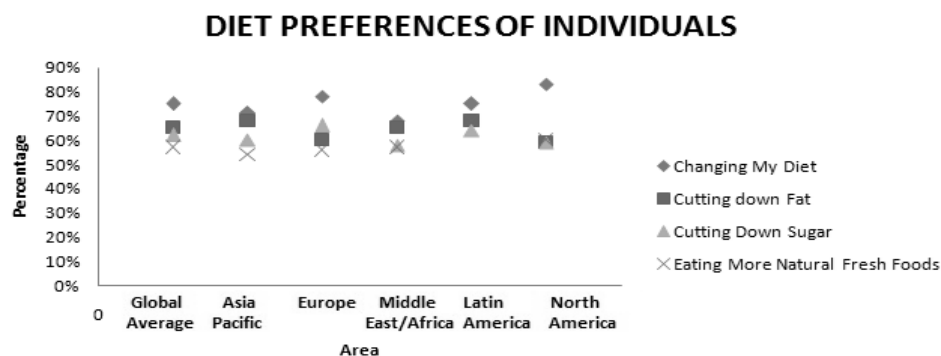
4. Niche Marketing - A Solution

To thrive in a highly competitive market, the date palm producers cannot effectively address the universal needs of everyone on the earth by 'one-size-fits-all' approach. The alternative solution appears to be a 'Go Niche' approach. For new businesses and the established businesses alike, a

focused and targeted marketing approach is preferable rather than claiming to have the solution for every consumer requirements. In this context 'Niche Marketing' will help the date palm industry in marketing, branding and positioning the right products to the right people through powering date-based brands with substantive campaigns.

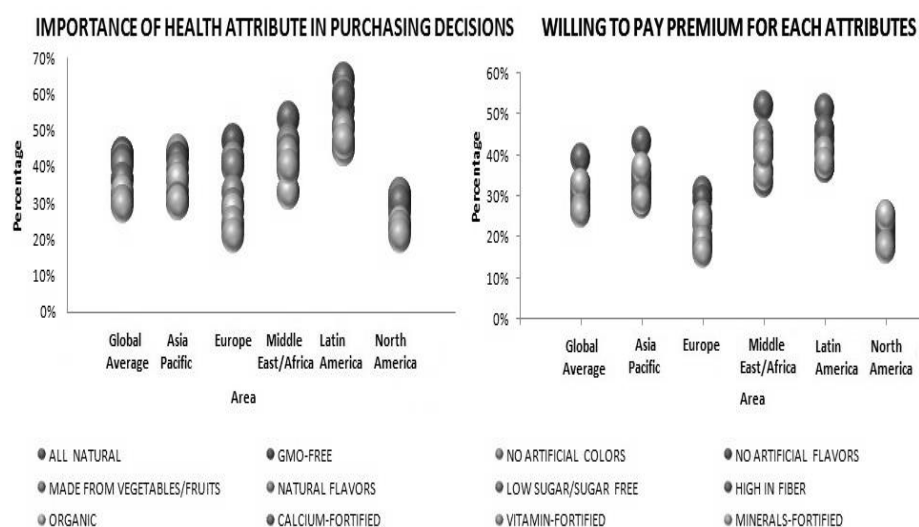
Mahmoudi et al. (2008) have found that the conventional date palm cultivation by individual countries is insufficient, product quality low, field and post-harvest losses high, and the date products and by-products utilization need improvement. They have recommended date palm processing and marketing through organic culture. Aljanobi (2009) has evaluated the date supply and recommended the production of unique, innovative products based on market demand with the available enormous amount of raw material. Al-Shreed et al. (2012) have identified five potential strengths of Saudi Arabian dates that may be used, individually or collectively, to strengthen the palm dates exports from the kingdom to all five groups taken in the study as importing countries where they also measured the potential market opportunities. Mbaga et al. (2011) have identified the need to develop alternative uses for dates such as baby food ingredients, sugar production from dates, baking ingredients, sweets, confectionery, chocolates, ice cream, salads, sauces, coffee, preservatives, breakfast cereals and soft drinks.

The diet preferences are on the changing track because of health related issues caused by changing life style and work culture in the population. People are willing to shift their diet accordingly if they get adequate fat-free and/or sugar-free ingredients assimilated with their food. The popularity of natural and/or fresh food is also an emerging trend in these regions.



Graph 3: Diet Preferences as Desired by People of Different Regions (Nielsen Survey, 2015)

The regions are demanding the food that delivers the improved qualitative characteristics. Some of the demand characteristics, as desired by the global population region-wise, are given in Graph 3 & 4. The Date producers, industrialists and food processing units can take help of these region-wise demand characteristics in their product design and pricing decision.



Graph 4: Importance of Health Attributes & Willingness to pay for health (Nielsen Survey 2015)

The preference factors region-wise and the willingness to pay a premium price for the given factors can guide the producers to develop the combinations of product attributes which can match the segment's taste for each variety. In Graph 3 above the demand of natural products is appearing to be at higher side in Latin America but Middle Eastern and African people are willing to pay premium on this attribute more than the former. North America is ready to pay for organic products but not paying more than those in Asia. This way, the analysis of attributes' preferences can help designing a marketing mix suitable for the targeted geographical markets.

Processing, value addition and value marketing are the strategic options that can substantially accelerate the growth of this industry. Market segmentation, targeting and positioning will be usual process to cover varied kinds of consumers by offering each one of them the combinations of attributes they prefer most. With a wide range of differentiated products, the industry will cover larger population, satisfy the consumers better and eventually achieve higher growth and earn profit as well.

5. Dates for Health Problems

The global demand for food, beverages and health products is growing rapidly. According to the Global Burden of Disease study (2013) 28% adults and 47% children are obese or overweight worldwide. Food and Agriculture Organization (FAO) is working hard to protect world population from undernourishment, child mortality, food inadequacy and other emerging diseases through MDG (Millennium Development Goals) and WHO (World Health Organisation). There is an emerging requirement to ensure providing safe, healthy and nutritious food and drinks. Date palm products have numerous inherent medicinal, nutritional and health advantages that have been identified, investigated and proved by the experts. Some of those have been picked up from the available literature and consolidated in Table 1 below:

Table 1: Health benefits of Date Palm as Reported in Literature

Uses & Role of Dates	Literature References
Dietary use of dates, seeds & date pit	Franz et al. 2002; Vayalil 2002; Biglari et al., 2009; Baliga et al. 2011; Jassim and Naji 2010
Date fruit and Date Seed Nutritional value	Al-Shahib and Marshall 2003; Al-Farsi and Lee 2008; Mayo-Wilson et al. 2011; Al-Hooti et al. 1997; Franz et al. 2002; Polyzos et al., 2007; Mayo-Wilson et al. 2011; Baliga et al., 2011; O'Dell and Sunde 1997; Appel et al. 1997; Al-Shahib and Marshall 2002; Mohammad and Habibi 2011; Al- Farsi et al. 2005; Joseph 1999; Wargovich 2000; Al-Hooti et al. 1997; El-Zoghbi 1997; Di et al. 1991; Mansouri et al. 2005; Maillard and Berset 1995; Tapas, et al. 2008;
Role of Dates as an Antioxidant	Pitsch et al. 2010; Folli et al. 2011; Saafi et al. 2011; Das and Das 2007; Biglari 2009; Sanzari et al. 2011; Das and Das 2007; Park et al. 2011; Ross et al. 2010; Biglari et al. 2009; Bardia et al. 2008; Alhussein 2009; Al- Farsi et al. 2005; Vayalil 2002; Pitsch et al. 2010; Al-Mamary et al. 2011; Farag 2011; Steinbrenner & Sies 2009; Ljubuncic et al. 2005; Deng et al. 2012; Biglari et al. 2008; Joseph et al. 1999; Vinson et al. 2005; Chaira et al. 2007; Al- Farsi et al. 2005; Baliga et al. 2011; Yeh et al. 2008
Role of Dates as an Antihyperlipidemic	Lusis 2002; Baliga et al. 2011; Al-Maiman 2005; Rock et al. 2009; Evans et al. 1999; Kattak 2002; Abuelgassim 2010; Amira et al. 2011; Shafiei et al., 2010
Role of Dates as a Hepatoprotective	Asha and Pushpangadan 1998; Adewusi and Afolayan 2010; Recknagel 1983; Adewusi and Afolayan 2010; Hrvoje et al. 2009; Miller et al. 2003; Bruck et al. 2001; Bastway et al. 2008; Al-Qarawi et al. 2001; Bruck et al. 2001; Bastway et al. 2008; Pitsch et al. 2010; Burtis and Ashwood 2001; Bastway et al. 2008; Al-Qarawi et al. 2004; Jassim and Naji 2010; Mohammad and Habibi 2011; Lin and Tome 1988; Pitsch et al. 2010; Al-Qarawi et al. 2004; El-Mougy et al., 1991; Kowalski et al. 1990; Al-Mamary et al., 2011; Baliga et al., 2011; Rikans et al. 1987
Role of Dates in Diabetes	Mokhtari et al. 2008; Aryangat and Gerich 2010; Ovbiagele et al. 2011; Miller et al. 2002; Brand-Miller et al. 2003; Jenkins et al. 2008; Alkaabi et al. 2011; Miller et al. 2003; Al-Hooti et al. 1997; Biglari 2009; Brand et al. 1991; Gilbertson et al. 2001; El-Mougy et al. 1991; Al-Shahib and Marshall 2002; Jenkins et al. 2008; Mohammad and Habibi 2011; Rock et al. 2009; Aryangat and Gerich 2010; Budin et al. 2009; Mard et al. 2010
Role of Dates in cancer	Vayalil 2002; Lakshmipathi et al. 2009; Saafi et al. 2011; Ishurda and John 2005; Fullerton et al. 2000

Note: The references, being more than 100, have not been included in the bibliography due to the paucity of space. These are easily available on the internet.

These works are providing enough justification for usefulness of date fruits, seeds and fronds in different forms for the diverse health needs of world population. We can use all parts of date palm to produce and offer as food, drink, food / drink ingredient, additive or even as a health remedy or medicine.

6. Date-based Products

There is a need to minimize competition within segments and focus on new segments of market with new products as alternatives to contemporary food and beverage items. Date is a fit item to be used for developing varieties of new products which may serve as healthy alternatives to contemporary food and beverage items. The date fruits and seeds contain variegated compositions such as dietary fiber, energy, sugar (fructose and dextrose), fatty acid, vitamins (thiamin, riboflavin, niacin, folate, vitamin A, C and K), nutrition, minerals (calcium, iron, phosphorus, sodium, potassium, copper, magnesium and zinc), protein, fats, carbohydrate, pigments, antioxidants flavonoids (tannins, β -carotene, lutein, and zeaxanthin), carotenoids, phenolic acids, anthocyanins etc. The medicinal benefits of date fruits and seeds are varied and not limited with antioxidant, anti-inflammatory, anti-mutagenic, anti-cancer, anti-analgesic, antipyretic, nephron-protective, hemolytic, anti-ageing, fertility, pregnancy, lactation, reproductive system, abdominal troubles and other medicinal benefits such as protection for colds, sore throat, fever etc. Further, date fruits and seeds can take the forms of minimally processed foods, processed culinary ingredients and ready-to-consume processed foods and beverages. Due to such gifted properties in this product, the product combinations and its variants are to be developed that address the requirements of different market segments to meet the global demands of those segments.

The market priority on the basis of above findings may be as under:
(Detail in Table 2)

Stage 1: Unprocessed and minimally processed foods: No processing, or mostly physical processes used to make foods durable, accessible, convenient, palatable, safe & attractive

Stage 2: Processed culinary or food industry ingredients: Extraction and purification of unprocessed or minimally processed foods, resulting in additives or ingredients used for preparation and cooking of dishes at home or restaurants or used for the manufacturing of ultra-processed food products

Stage 3: ultra-processed food products: Processing of a mix or processed culinary or food ingredients to create durable, accessible, convenient, easy to serve, ready to eat snacks or desserts as alternative to home dishes or other high demand foods

Table 2: Date-based Products and their fitness to Geographical Market segments

Food Stage	Examples	Market Priority
Stage 1	Fresh Dates, Chilled Dates, Vacuum Packed Dates, Dried Dates, pure date juice etc.	North America>Latin America>Middle East>Africa>Europe>Asia Pacific
Stage 2	Date seed Oil, Date flours, Date sucrose	Latin America>Asia pacific>Europe>Middle East> Africa>North America
Stage3	Use in Breads, Biscuits, cakes and pastries, ice-cream, jams, syrup, chocolates, confectionery, replace sugar in beverages and milk drinks, added ingredients for soft drinks, pizzas and/or other recipe, salads, noodle, infant milks, baby food and energy drinks	Middle East>Africa>Latin America>Asia pacific>Europe>North America

The above table is based on the preferences, willingness and shift of dietary habits of the regions.

Mikki (1998), in his research report, recommended strategic options to enhance the profitability by these plants through competitive production, marketing differentiation by branding, advertising, good distribution and continuous market research. New products including date paste, date syrup and vinegar and utilization of dates palm residues were also recommended. Sirisena et al. (2015), in finding the ways of developing a sustainable date palm industry in Australia, recommended the utilization of date seeds for health products for improving profitability and financial security of this industry.

7. Market Development

Development of new range of products from date palm will also require a market development effort for popularization and acceptance by the targeted segments. Research by Al-Shahib (2003) concluded that an improvement in health consciousness and nutrition education could significantly increase the demand for dates. Promoting the date products could also achieve substantial health benefits. Involving the marketing professionals for long-term market development will be unavoidable who will be entrusted with the following tasks:

- a) Attracting the health, nutrition and quality conscious segments to date and date products
- b) Demonstrating date-based variants as replacement of conventional ice creams, coffees, sweets, confectioneries, chocolates, preservatives, salads, sauces, breakfast cereals and soft drinks
- c) Positioning: Evolving a Marketing promotional plan (for signaling market position) to popularize them across the globe
- d) Running a social campaign for changing food habits for better health

To motivate the people for adoption of date-based food and beverages, a social transformation may be required across the regions. An all-round, coordinated and well organized social campaign to change the food habits of our society will include the following measures be taken up on regular basis:

- 1) Public Awareness Campaigns (through mass-contact events at country-wide level)
- 2) Publicity and Promotion (by using Mass Media and Marketing tools)
- 3) Education and Counselling (by incorporating the matter in educational text books)
- 4) A change of the mind-set (by organizing seminars, training programs & exhibits)
- 5) Awards and recognitions at all levels on promoting a healthy life style.

A comprehensive, integrated and well supported effort by public and private institutions will only help achieving this social transformation over a period of time. As a result, a tendency to prefer date-based healthy food and drink items will be visible. Mikki (1998) has called upon the production plants, research centres and the universities for a mutual cooperation and coordination to promote the date palm products, by-products and residues.

8. Conclusion

The date palm industry is presently troubled with underutilisation of its hidden economic and health potential. Quality up-gradation, value addition and target marketing will greatly enhance the revenue generating and profit making capacity of the industry. Developing the premium value-added items out of date palm resources can solve many of the nutrition and health related problems in the developed and developing nations. Launching such food and beverages, food additives and ingredients and the industrial material made out of date palm as premium products or by-products will leverage this industry to achieve a competitive edge in the market. Strategic use of Niche Marketing will attract the right people to the right products to tap the full potential of date palm wealth. Running a promotional campaign for a social transformation will also help popularizing these date-based products across the globe.

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Fiscal Sustainability in Major South Asian Economies: Evidences from Panel Data Analysis

Shruti Shastri¹, A.K. Giri² and Geetilaxmi Mohapatra³

The paper examines the issue of fiscal sustainability for a panel of five major South Asian economies namely, India, Pakistan, Bangladesh, Sri Lanka and Nepal, for the period from 1985-2014. The results of panel cointegration tests by Pedroni (1999) and Westerlund (2007) confirm the presence of a long-run relationship between government revenue and expenditure. The panel autoregressive distributed lag (ARDL) estimates of the fiscal reaction function indicate a positive long-run response of the primary balance to the rising public debt ratio, thus confirming fiscally responsible behaviour in the region. However, the size of the cointegrating slope parameter between revenue and expenditure obtained from the group mean fully modified OLS (FMOLS) and the group mean dynamic ordinary least squares (DOLS) is significantly less than one, indicating weak form of fiscal sustainability. The weak sustainability underscores the need for commitment to long term fiscal discipline and justifies the ongoing efforts by the South Asian countries to strengthen their fiscal positions.

1. Introduction

The sustainability of public finances is currently a key policy issue in both developed and developing economies. An unsustainable fiscal position threatens both macroeconomic stability and the financial capacity of the state to deliver essential goods and services to citizens. Moreover, if fiscal positions are perceived to be unsustainable over the long term, then the

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reaction of the markets could trigger a fiscal crisis much sooner than might be expected by fiscal planners (Canagarajah et al., 2012).

Focusing on the issue of fiscal sustainability among developing economies, the case of South Asia deserves particular attention. Notwithstanding the high rate of real growth in the recent past, the fiscal situation in the region exhibits signs of distress. The reform process initiated in the late 1980s and the early 1990s in the region involved measures aimed at the simplification of tax systems, introduction of a value added tax and streamlining of expenditures. Due to the reforms, South Asia's fiscal deficits are decreasing gradually but remain consistently high relative to other developing regions (see Table 1). The persistence of the deficits may be attributed to the region's limited success in widening the tax base due to structural factors, such as large share of agriculture in national output, low literacy, large informal sectors, etc., coupled with populist spending raising prospects of unsustainable public finances.

Table 1: Fiscal Balance in South Asia vis a vis Developing Country Groupings

Country Groups	2000-10	2011	2012	2013	2014	2016 ^f
East Asia and Pacific	-1.6	.2	-.3	-2.3	-2.1	-2.1
Europe and Central Asia	-4.4	.7	-.6	-1.3	-1.5	-1.5
Latin America and the Caribbean	-2.6	-3.1	-3.6	-4	-5.2	-4.1
Middle East and North Africa	0.1	-4	-3.8	-6	-7.1	-5.3
South Asia	-7.4	-7.6	-7.2	-6.9	-6.7	-6.1
Sub Saharan Africa	-.6	-1.1	-1.7	-2.9	-2.5	-2.2

Source: Global Economic Prospects, January 2015

Note: f denotes forecast.

Against this backdrop, this paper aims to examine the sustainability of public finances for the five largest countries in South Asia namely, India, Pakistan, Bangladesh, Sri Lanka and Nepal, for the period from 1985-2014. The concept of fiscal sustainability implies the fulfilment of the so-called inter-temporal budget constraint (IBC), which states that the current level of debt in an economy should equal the present value of future fiscal surpluses. If this condition is to be met, economies cannot

indefinitely issue debt to cover fiscal deficits, as the markets will observe a risk of bankruptcy (Carrion-i-Silvestre, 2015).

This paper seeks to employ two alternative approaches to test whether this condition is satisfied. First, we use co-integration techniques to assess whether there is a long-run relationship between the government revenues and expenditures. Second, we investigate whether the fiscal rule that relates the fiscal primary surplus and debt holds for the countries. The contribution of the paper to the existing literature is twofold. First, given the traditional problems related to the cointegration analysis using short-term data, we use panel data econometric techniques for assessment of fiscal sustainability. Single country time series estimation may suffer from shorter spans of data with associated smaller degrees of freedom and low power. Panel cointegration allows more variation in the data which could result in increased efficiency of the estimators. The empirical studies examining the issue of fiscal sustainability in a panel framework have mostly employed econometric techniques that impose homogeneity of slope coefficients across countries—an assumption that is likely to be violated. In this paper, we use panel approaches that allow for flexibility related to cross country heterogeneity. To the best of our knowledge, the present study is the first empirical application of these techniques in the assessment of fiscal sustainability for South Asian countries.

A further contribution is an evaluation of the degree of fiscal sustainability. This issue is usually disregarded in the existing literature pertaining to the selected countries, either because the analysis of sustainability is based on the assessment of interest–growth differentials (e.g., Ejaz and Javid, 2011; Mahmood, Arby and Sherazi, 2014) or stochastic properties of public debt (e.g., Buiter and Patel, 2006; Deyshappriya, 2012) or because the estimates of the cointegrating vector between expenditure and revenue are not discussed (e.g., Jha, 2004; Kaur and Mukherjee, 2012; Munawar Shah et al., 2014).

The remainder of this paper is organized as follows: Section 2 provides a brief review of the literature. Section 3 discusses the data and methodology. Section 4 addresses the empirical assessment of fiscal sustainability, and finally, Section 5 offers concluding remarks.

2. Review of Literature

Measuring fiscal sustainability has been a highly contentious issue (Chalk and Hemming, 2000). Advancements in time-series techniques provided analysts with tools to test for the sustainability of fiscal policy via the fulfilment of IBC. The empirical contributions in this line can be broadly classified into two strands. The earlier studies following a univariate approach analyse the compliance to the budget constraint in terms of the mean-reverting behaviour of deficit and debt-GDP ratio series (e.g., Hamilton and Flavin, 1986; Wilcox, 1989). Second, the multivariate approach involves examining the long-run relationship between the flows of revenues and expenditures (e.g., Trehan and Walsh, 1988; Hakkio and Rush, 1991; Haug, 1991; Quintos, 1995). The subsequent studies refined the analysis by incorporating the possibility of structural changes that are associated with different degrees of sustainability (e.g., Quintos, 1995; Martin, 2000; Afonso, 2005) and generalized the definition of sustainability to distinguish between strict and weak sustainability (see the discussion below).

With advancements in cointegration techniques, the long run relationship between revenue and expenditure has been widely examined for assessing fiscal sustainability (e.g., Payne, 1997; Olekalns and Cashins, 1997; Hatemi-J, 2002; Afonso and Jalles, 2012; Dalgıç, İyidoğan and Balıkcıoğlu, 2014).

However, Bohn's (1998, 2007) seminal work, challenges the time series literature on fiscal policy suggesting that stationarity-based sustainability tests are invalid because in an infinite sample, any order of integration of debt is consistent with the transversality condition, which implies that the IBC may be satisfied even if these particular time series tests are not. Moreover, the time series tests of fiscal sustainability do not explicitly identify the fiscal policy reactions underlying the data. As a result they do not shed much light on the kinds of policies that might deliver sustainability. (Adams, Ferrarini and Park, 2010)

Bohn (1998, 2007), therefore, suggested an alternative model-based approach to fiscal sustainability. In case fiscal authorities take corrective measures in response to deterioration in the debt position, rising debt ratios lead to higher primary surpluses relative to GDP, which indicates a tendency of debt towards mean reversion. Accordingly, a stable and

strictly positive feedback from debt stock to primary surplus is a sufficient condition for fiscal sustainability. The model-based approach to fiscal sustainability has also been widely employed in the empirical literature (e.g., Prohl and Schneider, 2006; Ghatak and Sánchez-Fung, 2007; Ehrhart and Llorca, 2007; Afonso and Jalles, 2012; Carrion-i-Silvestre, 2015; Mackiewicz-Łyziak, 2015).

The empirical literature offers mixed results regarding the sustainability of fiscal positions of countries. The results vary according to the econometric techniques employed and the countries analysed. As noted by Westerlund and Prohl (2010) the weak empirical support for sustainability hypothesis by a number of studies may be due to the poor precision of commonly applied time series tests. To avoid this problem, some recent empirical attempts employ panel analysis for a group of countries since panel methods are considered more powerful than conventional time series methods(e.g., Ehrhart and Llorca(2007), Afonso and Rault (2007), Adedeji and Thornton(2008) ,Mercan (2013), Afonso and Rault (2013))

However, the empirical studies examining the intertemporal fiscal solvency constraint in the panel framework have almost exclusively focused on developed countries (OECD and EU members). The case of developing Asia and particularly that of South Asia is hardly explored. Moreover, the panel econometric techniques mostly employed in the aforementioned studies impose homogeneity of slope coefficients across countries. In view of this gap, the present study examines fiscal sustainability in major South Asian economies using panel approaches that allow for flexibility related to cross country heterogeneity.

3. Data and Methodology

The empirical strategy of the paper relies on two alternative approaches proposed by Hakkio and Rush (1991) and Bohn (1998) as discussed above. The theoretical framework underlying the first approach relies on the government's dynamic budget constraint and on the assumption that the interest rate follows a stationary stochastic process. Fiscal

sustainability can then be tested through the following cointegrating regression⁴:

$$R_t = a + bG_t + u_t \quad [1]$$

where R_t and G_t are government revenue and expenditures inclusive of interest payments on debt; u_t is a stationary random variable and a and b are cointegrating parameters.

Following Quintos (1995), the fiscal sustainability exists in a “strong” form if and only if R_t and G_t are cointegrated and $b = 1$. The fiscal stance is instead only “weakly” sustainable if $0 < b < 1$ in Equation [1]. Under this milder sustainability condition, government expenditures grow, on average, at a rate higher than government receipts. Finally, if the null hypothesis $b = 0$ cannot be rejected, the fiscal stance is unsustainable.

The alternative strategy proposed by Bohn (1998) involves estimating a fiscal reaction function (FRF) and checking whether there is a corrective response by the government to increases in the public debt. The model suggested by Bohn takes the following form:

$$S_t = \rho B_t + \alpha Z_t + \varepsilon_t \quad [2]$$

where S_t is the primary balance, B_t is the level of debt in the economy at the beginning of period t (which can be approximated by the level of debt in the period $t - 1$) and Z_t is a vector of explanatory variables that captures the economic cycles. The sufficient condition for sustainability requires $\rho > 0$ so that the government would take corrective actions – reducing the level of expenditure (excluding interest on debt) and/or increasing tax revenues – to offset the changes in the level of debt.

The empirical estimates in the paper are based on annual data on general government fiscal variables spanning from 1985-2014. The choice of the period as well as the selection of the five countries out of the eight in the South Asian region is based on the availability of consistent data. All the variables are measured in relation to GDP to obtain a more natural

⁴ see Afonso and Jalles (2012) for a formal proof

definition of sustainability that keeps pace with economic growth (Afonso, 2005) and to achieve similarly scaled series that offer easily interpretable information. The data are assembled from Key Indicators for Asia and the Pacific, the Asian Development Bank, World Economic Outlook Database and various International Monetary Fund (IMF) country publications and reports, such as IMF Article IV documents and Statistical Appendixes.

The stationarity properties of the data are tested using the Maddala and Wu (1999) test (M-W) and a second-generation panel unit root test, namely, the Pesaran's (2007) cross sectionally augmented IPS (CIPS) test. The M-W test combines the significance levels of individual Phillips- Perron or Augmented Dickey Fuller unit root tests for each cross-section i to construct an overall test statistic based on the test suggested by Fisher (1932):

$$\lambda = -2 \sum_{i=1}^N \ln v_i \quad [3]$$

where v_i is the p-value of the unit root test for country i . The statistic λ has a χ^2 distribution with $2N$ degrees of freedom where N denotes the number of panels. The null hypothesis tested is that all panels have a unit root versus the alternative that at least one panel is stationary. The M-W test is, however, based on a restrictive assumption that individual time series in the panel are cross-sectionally independent. The CIPS test relaxes this assumption and controls for the presence of cross-sectional dependence of the contemporaneous error terms. The test is based on a cross-sectionally augmented ADF (CADF) regression, which filters out the cross-sectional dependence by augmenting the ADF (p) regressions with the lagged cross-sectional mean and the lagged first differences of the cross-sectional mean. The estimated model is as follows:

$$\Delta y_{it} = a_{i0} + a_{i1} t + a_{i2} y_{i,t-1} + a_{i3} \bar{y}_{t-1} + \sum_{j=0}^p d_{ij} \Delta \bar{y}_{t-j} + \sum_{j=1}^p \delta_{ij} \Delta y_{i,t-j} + v_{it} \quad [4]$$

Let $\tilde{t}_i$ denotes the t-ratio for α_{i2} in the above regression, the CIPS statistic is defined as:

$$CIPS = N^{-1} \sum_{i=1}^N \tilde{t}_i \quad [5]$$

The null hypothesis of the test is the unit root for all the time series in the panel, while the alternative hypothesis is a stationary process for at least one of the time series.

To investigate the presence of a long-run relationship, both first and second -generation panel cointegration tests by Pedroni (1999) and Westerlund (2007) respectively are employed. Following Pedroni(1999), the estimated co-integration relationship between government revenue and expenditure is specified as follows:

$$R_{it} = \alpha_i + \delta_i t + \beta_i G_{it} + \varepsilon_{it} \quad i=1,2, \dots, N; t=1,2, \dots, T \quad [6]$$

This formulation allows for considerable heterogeneity as follows: fixed effect (α_i), individual deterministic trend (δ_i) and a heterogeneous slope coefficient (β_i). The term $\varepsilon_{it} = \rho_i \varepsilon_{it-1} + v_{it}$ represents the estimated residuals from the panel regression. Pedroni (1999) developed seven statistics to test the null hypothesis of no cointegration. Panel v, panel rho, panel pp and panel ADF statistics are commonly referred to as within-dimension or panel cointegration statistics and the remaining three test statistics, group rho, group pp and group ADF are based on pooling along what is commonly referred to as between dimension or group mean panel statistics. For the panel cointegration statistics the alternative hypothesis is given by $H_a: \rho_i = \rho < 1, \forall i$ and for the group mean cointegration test, $H_a: \rho_i < 1, \forall i$. The group mean cointegration tests, thus, allow for a heterogeneous coefficient under the alternative hypothesis.

Along with the Pedroni test we also perform the Westerlund (2007) co-integration test which delivers robust critical values through the bootstrap approach even under the assumption of cross-section dependence. The test checks whether an error correction model has or not an error correction (individual group or full panel) based on the following equation:

$$\Delta R_{it} = c_i + \alpha_i (R_{it} - \beta_i G_{it} - 1) + \sum_{j=1}^{p_i} \theta_{ij} \Delta R_{it-j} + \sum_{j=1}^{p_i} \gamma_j \Delta G_{it-j} + e_{it} \quad [7]$$

where α_i is the speed of adjustment term. If $\alpha_i = 0$, there is no error correction and the variables are not co-integrated. If $\alpha_i < 0$, the model is error correcting implying that the variables are co-integrated. Westerlund (2007) developed four panel co-integration tests without any common-factor restriction. $P\tau$ and Pa tests are designed to test the alternative hypothesis that the panel is co-integrated as a whole, whereas the two other tests, $G\tau$ and $G\alpha$ test whether at least one element in the panel is co-integrated.

The coefficients of the long-run relationship are obtained using group-mean estimators which allow for flexibility related to cross-country heterogeneity. In particular, we employ the group mean fully modified ordinary least squares (GM-FMOLS) and group mean dynamic ordinary least square (GM-DOLS) estimators. The GM-FMOLS estimator, derived by Pedroni (2000) uses the group mean of individual FMOLS estimators and corrects for endogeneity and serial correlation by estimating the long-run covariance directly. The estimator has satisfactory size and power properties even for small panels, if T is larger than N (Pedroni, 2000). The group-mean panel FMOLS estimator for Eq. [6] can be written as:

$$\hat{\beta}_{GFM} = \frac{1}{N} \sum_i \left[\frac{\sum_{t=1}^T (G_{it} - \bar{G}_i) R_{it}^* - T \hat{\gamma}_i}{\sum_{t=1}^T (G_{it} - \bar{G}_i)^2} \right] \quad [8]$$

where $R_{it}^* = (R_{it} - \bar{R}_i) - \frac{\hat{\Omega}_{21,i}}{\hat{\Omega}_{22,i}} \Delta G_{it}$ and $\hat{\gamma}_i = \hat{\Gamma}_{21,i} + \Omega_{21,i}^0 - \frac{\hat{\Omega}_{21,i}}{\hat{\Omega}_{22,i}} (\hat{\Gamma}_{11,i} + \Omega_{11,i}^0)$. Here, $\hat{\Omega}_i = \hat{\Omega}_i^0 + \hat{\Gamma}_i + \hat{\Gamma}_i'$ is the estimated long-run covariance matrix of the stationary vector consisting of the estimated residuals from the cointegration regression and the differences in government expenditures. $\Omega_{21,i}^0$ is the long-run covariance between the stationary error terms (ε_{it} in equation 6) and the unit root

autoregressive disturbances. $\Omega_{22,i}^0$ is the long-run covariance among the difference in government expenditures. $\bar{\hat{r}}_i$ is the weighted sum of the autocovariances and a bar over the letters denotes the mean for i members. The associated t-statistic for the between-group FMOLS estimator takes the following form:

$$t_{\hat{\beta}_{GFM}} = \frac{1/\sqrt{N} \sum_{i=1}^I N \Xi \left[\hat{\beta}_i(FM, i) \right] - \beta}{\left(\Omega_{11,i}^{-1} \sum (G_{it} - \bar{G}_i)^2 \right)^{1/2}} \quad [9]$$

where β is a value under the null hypothesis. The above t-statistic is standard normal as T and N approach infinity.

Next, the GM-DOLS panel cointegration estimator is considered. DOLS uses the past and future values of ΔG_{it} as additional regressors to correct for endogeneity and serial correlation.. The between-group panel DOLS regression can be written as follows:

$$R_{i,t} = \alpha_i + \delta_i t + \beta_i G_{i,t} + \sum_{k=-ki}^{ki} \gamma_{ik} \Delta G_{i,t-k} + u_{i,t}^* \quad [10]$$

$$\hat{\beta}_{DOLS} = \left[\frac{1}{N} \sum_{i=1}^I \left(\sum_{t=1}^T Z_{i,t} Z_{i,t}' \right)^{-1} \left(\sum_{t=1}^T Z_{i,t} \hat{R}_{i,t} \right) \right]_1 \quad [11]$$

where $Z_{i,t}$ is the $2(K+1)1$ vector of regressors; $Z_{i,t} = (G_{it} - \bar{G}_i, \Delta G_{i,t-k}, \dots, \Delta G_{i,t+k})$ and $\tilde{R}_{i,t} = R_{i,t} - \bar{R}_i$. A bar over the letters denotes the mean, and the subscript 1 outside the bracket denotes the first element of the vector used to obtain the pooled slope coefficient. The associated t statistic for the group mean estimators is constructed as follows:

$$t_{\hat{\beta}_{DOLS}} = \frac{1/\sqrt{N} \sum_{i=1}^I N \Xi \left[\hat{\beta}_i(D, i) \right] - \beta}{\left(\frac{1}{\sigma_i^2} \sum (G_{it} - \bar{G}_i)^2 \right)^{1/2}} \quad [12]$$

where $\hat{\sigma}_i^2$ is the long run variance of the residuals from the DOLS regression and $\hat{\beta}_{D,i}$ is the conventional DOLS estimator. The t statistic is standard normal as T and N approach infinity. Both GM-FMOLS and GM-DOLS allow the control of the likely cross-sectional dependence by including common time dummies in the model.

For the robustness of results, we employ the common correlated effect mean group (CCEMG) estimator. CCEMG is a generalization of mean group estimator by Pesaran and Smith (1995) and is consistent in the presence of unobserved common factors proxied by the inclusion of cross sectional averages of dependent ($\bar{R}$ in our case) and independent variables ($\bar{G}$) in the regression setup. The model considered is:

$$R_{it} = \beta_i G_{it} + c_i \bar{R}_t + d_i \bar{G}_t + \varepsilon_{it} \quad [13]$$

In the presence of a mix of stationary and non-stationary series, the fiscal reaction function may be estimated through the panel autoregressive distributed lag (ARDL) approach (e.g., Asiama, Akosah and Owusu-Afriyie, 2014; Akosah 2015; Waheed, 2016 etc.). In panel ARDL form the FRF equation may be written as:

$$PS_{it} = \alpha_i + \varphi_i B_{it-1} + \theta_i Z_{it-1} + \sum_{j=1}^{pi-1} \psi_{ij} \Delta PS_{i,t-j} + \sum_{j=0}^{ki} \varphi_{ij}^* \Delta B_{i,t-j} + \sum_{j=0}^{li} \theta_{ij}^* \Delta Z_{i,t-j} + \mu_{it} \quad [14]$$

where $i = 1, 2, \dots, 5$, $t = 1985, \dots, 2014$ and μ_{it} is the error term assumed to be independently distributed across i and over t . The terms φ_i, θ_i represent long run coefficients; $\psi_{ij}, \varphi_{ij}^*, \theta_{ij}^*$ represent short run coefficients, and series PS , B and Z are as defined earlier. Following the basic specification of Bohn (1998), Z includes temporary factors impacting the primary balance including output gap (Y_{gap}) and government expenditure gap (G_{gap}). The former captures the cyclical conditions and the latter accounts for unexpected expenditures, unrelated to the economic cycle, such as military expenditures. The output (expenditure) gap is measured

as a ratio to potential output (expenditure) i.e. actual output (expenditure) less potential output (expenditure) divided by potential output (expenditure) where the potential output is proxied by the trend obtained with the Hodrick- Prescott filter. The possible non-linearities in the relationship are investigated by adding the quadratic term $(B_{t-1})^2$ as an explanatory variable.

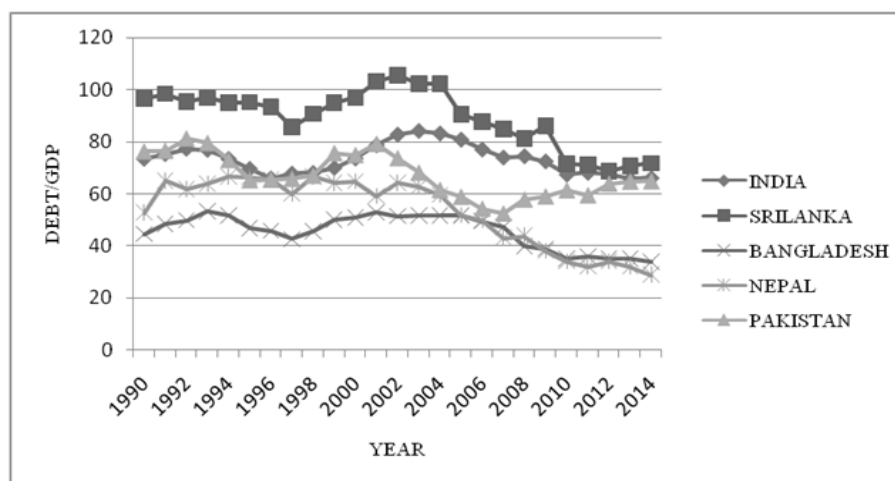
Pesaran and Shin (1999) suggest two estimators for the ARDL model, the mean group estimator (MGE) and the pooled mean group estimator (PMGE). The PMGE allows short-run coefficients, including the intercepts, the speed of adjustment to the long-run equilibrium values, and error variances to be heterogeneous while the long-run slope coefficients are restricted to be homogeneous across countries.

The MGE requires estimating separate regressions for each country and calculating the coefficients as unweighted means of the estimated coefficients for the individual countries. It allows for all coefficients to vary and be heterogeneous in the long-run and short-run.

The homogeneity test for long-run parameters is performed using the test suggested by Hausman (1978). Under the long run homogeneity assumption, both MGE and PMGE are consistent estimators, but only PMGE is the efficient estimator.

4. Empirical Analysis

Before the formal econometric analysis of fiscal sustainability, a brief characterization of the data may be appropriate at the outset. Generally speaking, the debt to GDP ratio exhibits a declining trend after 2000 for all the countries under considerations (see Figure 1). In case of India, the debt ratio registers a decline from 2003 which marks the period of implementation of the Fiscal Responsibility and Budgetary Management (FRBM) Act. An uptick in the debt ratio during 2007-08 may be observed in the case of India, Pakistan and Sri Lanka reflecting the effect of the Global Financial Crisis.

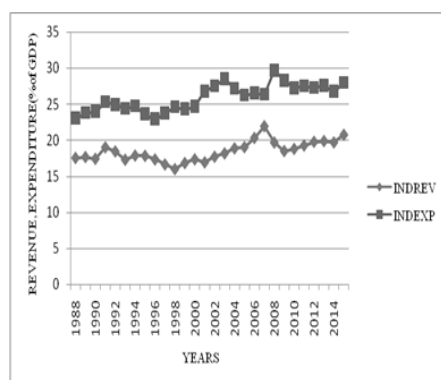
Figure 1: Public Debt to GDP: 1990-2014

Source: World Economic Outlook Database, October 2016.

Figures 2-6 capture the trends in revenue/GDP and expenditure/GDP for the countries. Among all economies, only Nepal has experienced a notable rise in its revenue/GDP ratio during the 1985-2014 period. The ratio has declined for Pakistan and Sri Lanka, and oscillated in a narrow range for India and Bangladesh. A preliminary inspection of the graphs indicates a synchronized behaviour of revenue and expenditure for all countries hinting at a possible long-run relationship. However, expenditure as a share of GDP on average exceeds the revenue share for all the countries which seemingly supports the weak sustainability hypothesis.

Figure 2: Revenue Expenditure
(%of GDP)

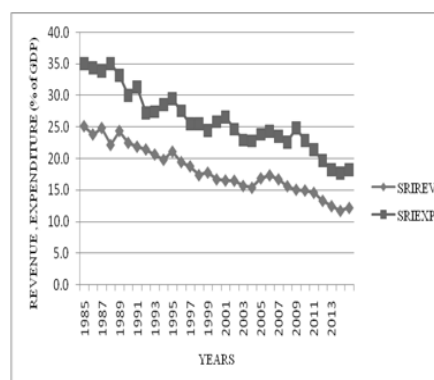
India



Source: World Economic Outlook Database

Figure 3: Revenue Expenditure
(%of GDP)

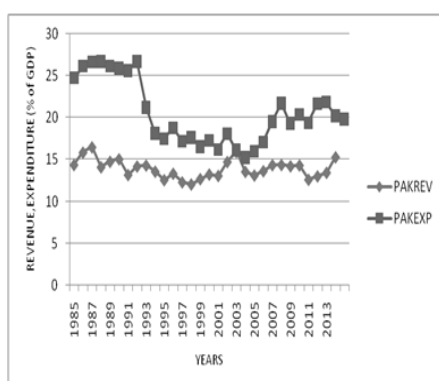
Sri Lanka



Source: World Economic Outlook Database

Figure 4: Revenue Expenditure
(%of GDP)

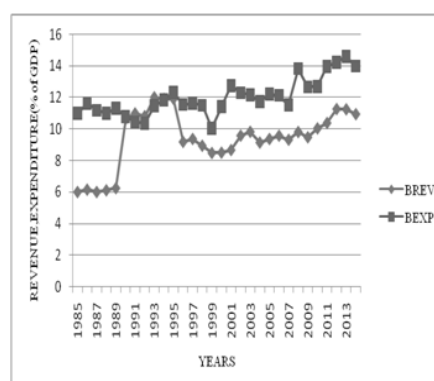
Pakistan



Source: World Economic Outlook Database

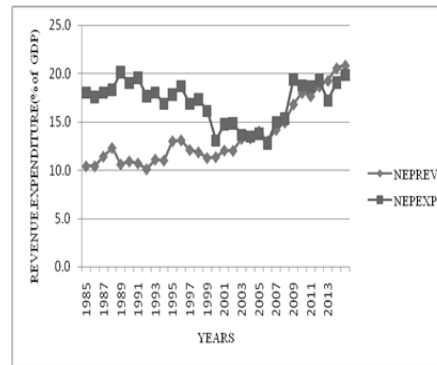
Figure 5: Revenue Expenditure
(%of GDP)

Bangladesh



Source: World Economic Outlook Database

Figure 6: Revenue Expenditure (%of GDP)
Nepal



Source: Key Indicators for Asia and the Pacific

Next, we focus on the econometric examination of sustainability conditions as discussed in Section 3. To set the stage for cointegration analysis, the series are subjected to the investigation of unit roots. The results of M-W and CIPS unit root tests reported in Table 2 show that the null hypothesis of $I(1)$ series is rejected only for the PS series under both the tests⁵. The null is rejected for series R and G under the M-W test for the 0th lag only. The CIPS test, however, fails to reject the null for R, G and B series consistently for all lags. Therefore, whereas series R, G and B may be considered integrated of order one, series PS is $I(0)$.

Table 2: Results of Panel Unit Root Tests

Test	R	G	B	PS
M-W	37.56*** (0)	42.59*** (0)	4.17 (0)	33.6*** (0)
	20.00 (1)	22.72 (1)	7.47 (1)	20.2** (1)
	10.85 (2)	16.09 (2)	8.51 (2)	22.7*** (2)
	14.02 (3)	8.22 (3)	11.01 (3)	14.6 (3)
CIPS	0.48 (0)	-1.09 (0)	.49 (0)	-4.0*** (0)
	2.047 (1)	-.378 (1)	.125 (1)	-1.78** (1)
	3.043 (2)	1.95 (2)	.99 (2)	-1.90** (2)
	3.064 (3)	2.62 (3)	.85 (3)	-1.01 (3)

⁵ At the outset the cross- sectional dependence in the data was tested using the Breusch Pagan LM test. The null of cross sectional independence was rejected for all series except revenue /GDP indicating the need to employ second generation panel unit root and cointegration tests.

*Note:****, ** show significance at 1% and 5% respectively. Figures in parenthesis are lag lengths. An intercept and trend are included. Figures in parentheses are p-values. H0: series is I(1) for all panel, H1: series is stationary for some panel.

As a first step towards evaluating fiscal sustainability, the long-run relationship between revenue and expenditure is examined. The results of Pedroni (1999)'s panel cointegration test reported in Table 3 indicate that majority of within and between dimension tests reject the null hypothesis of no cointegration.

Therefore, it may be concluded that revenue and expenditure share a long run stochastic trend in the selected sample of South Asian countries for the period from 1985-2014.

Table 3: Results of Pedroni's Panel Cointegration Test

Panel cointegration (within dimension) statistics	
Panel v- statistic	1.04
Panel rho- statistic	-2.02***
Panel PP- statistic	-2.91***
Panel ADF- statistic	-3.04***
Group mean (between dimension) statistics	
Group rho- statistic	-1.00
Group PP- statistic	-2.59***
Group ADF- statistic	-2.68***

Note: Deterministic intercept and trend included. Automatic lag length selection based on SIC with a max lag of 5. Newey-West automatic bandwidth selection and Bartlett kernel. ***, ** show significance at 1%, 5% respectively.

Since the Pedroni cointegration test fails to take into account the cross-country dependence, a second generation cointegration test proposed by Westerlund (2007) is also employed. In small datasets, with $T=30$, Westerlund (2007) warns that the results of the tests may be sensitive to the specific choice of lag and lead lengths. Hence, to avoid overparameterization and the resulting loss of power, we hold short-run dynamics fixed by taking lead and lag=1. The results of the Westerlund (2007) test reported in Table 4 indicate that all four tests confirm presence of cointegration at 5%. The findings from second generation panel cointegration test thus corroborate those of first generation test.

Table 4: Results of Westerlund (2007) Panel Cointegration Test

Test	Value	P	Robust p
$G\tau$	-2.12	0.00	0.01
$G\alpha$	-9.6	0.00	0.00
$P\tau$	-4.6	0.00	0.02
$P\alpha$	-7.58	0.00	0.01

Note: The test takes no cointegration as null. The test regression is fitted with a constant and one lag and lead. The Kernel bandwidth is set according to rule $4(T/100)^{2/9}$. The p values are for one-sided test based on normal distribution. Robust p values are for one-sided test based on bootstrap replications.

After confirming cointegration, the next step is to estimate the coefficients of long-run relationship and draw inferences regarding the degree of sustainability. The estimates of long run coefficients are reported in Table 5.

Table 5: Long Run Coefficients under Alternative Estimators
(Dependent Variable: Revenue)

	MG-DOLS		MG-FMOLS		CCEMG	
	Coeff	Chi square ($H_0: \beta=1$)	Coeff	Chi square ($H_0: \beta=1$)	Coeff	Chi square ($H_0: \beta=1$)
Expenditure	0.73	11.32 (0.00)	0.61	8.27 (0.00)	0.76	18.61 (0.00)
ECT	-0.243***		-0.236***		-0.218***	

Note: Figures in parenthesis are p values. *** indicates significance at 1%. To control for cross sectional dependence, MG-DOLS and MG-FMOLS models are estimated including time dummies.

As evident from the table, all three estimators, namely, MG-DOLS, MG-FMOLS and CCEMG indicate a positive slope coefficient. However, the chi square restriction on the coefficients consistent with 'strong' fiscal sustainability ($b=1$) is rejected at high significance levels for all three estimates indicating that the sustainability exists only in the 'weak' form. The 'weak' fiscal sustainability implies that government expenditures are systematically higher than government revenues. Therefore, although the IBC is satisfied in the strict sense (because the bubble term goes to zero), the upward pressure on the stock of debt is likely to increase the risk of default, forcing the government to offer higher interest rates to service its debt (Quintos, 1995).

The error correction term (ECT) estimated by inserting long run coefficients in short run dynamic specification of the models is negative and statistically significant under all estimators. The negative ECT shows that the system is driven to its long run cointegration path with a speed of adjustment of approximately 22-24% per year.

After examining the cointegration between revenue and expenditure we proceed to evaluate fiscal sustainability through the alternative strategy proposed by Bohn (1998, 2007). Given that the debt series is $I(1)$ while the primary surplus series is $I(0)$, the fiscal policy reaction function is estimated using panel ARDL model. As shown in Table 6, the long run coefficients of public debt is positive and statistically significant under both the MG and PMG estimators, indicating that fiscal authorities react systematically to rising public debt ratio to ensure fiscal sustainability. The estimates indicate that the primary balance improves on average between 0.03 and 0.04 percentage point in response to a one percentage point increase in debt ratios thus confirming fiscally responsible behaviour.

Table 6: Results of Panel ARDL Estimates of Fiscal Reaction Function

Variable	MGE	PMGE
Long Run Coefficients		
B_{t-1}	0.033*** (0.009)	0.043*** (0.016)
$(B_{t-1})^2$	0.039*** (0.012)	0.062*** (0.011)
Y_{gap}	0.07** (0.03)	0.063** (0.03)
G_{gap}	-0.029**** (0.007)	-0.017*** (0.0016)
Short Run Coefficients		
ΔPS_{t-1}	0.33*** (0.053)	0.41*** (0.123)
ΔB_{t-1}	0.013* (0.007)	0.038* (0.017)
$\Delta (B_{t-1})^2$	0.021* (0.0115)	0.0109* (0.0059)
ΔY_{gap_t}	0.113** (0.053)	0.144** (0.067)
ΔG_{gap_t}	-0.058* (0.032)	-0.074** (0.033)
ECT	-0.37*** (0.047)	-0.33*** (0.05)
Hausman Test	56.16***	

Note: MGE: Mean group estimator, PMGE: Pooled mean group estimator. Optimal lag structure based on Akaike's Information Criterion is ARDL (1,1,1,1,1). The null hypothesis under the Hausman test is that the difference in the estimated coefficients between the MG and PMG is not significantly different and that PMG is more efficient. *, **, *** indicate 1%, 5% and 10% levels of significance, respectively. Standard errors are shown in parentheses.

The response of primary balance to the squared debt term is also positive, significant and larger than the coefficient of lagged debt implying that the fiscal response is stronger when debt-to- GDP ratios are higher. The coefficient on output gap is positive implying that a positive shock to the output gap raises primary surplus by a factor of 0.06 -0.07 on average. The coefficient of expenditure gap is negative under both estimators indicating that an increase of expenditure above its potential lowers the primary surplus.

The short-run error correction models linked to the long run functions show that the explanatory variables maintain their long run signs in the short run as well. The coefficient of debt, however, is weaker in terms of statistical significance. The sign and significance of the estimated coefficient of lagged primary balance under both the estimators indicates that fiscal policy exhibits a strong degree of inertia in the region, causing the sign and magnitude of primary budgets in one year to depend substantially on the previous years' budgetary outcome and decisions. This should come as no surprise, as government budget plans typically run over several years, and many of the revenue and expenditure items are irreversible in the short term. The Hausman test statistics enables us to make a choice between the two estimators. The null hypothesis that MGE and PMGE are consistent estimators, but only PMGE is the efficient estimator is rejected implying that the appropriate estimator is MGE.

5. Conclusion

The study examines the issue of fiscal sustainability for a panel of five major South Asian economies namely, India, Pakistan, Bangladesh, Sri Lanka and Nepal, for period from 1985-2014, using two alternative approaches. First, we assess whether there is a long-run relationship between the government revenues and expenditures. Second, we investigate whether the fiscal rule that relates the primary surplus and debt holds for the countries.

The results of panel cointegration tests by Pedroni (1999) and Westerlund (2007) confirm the presence of a long- run relationship between government revenue and expenditure. The panel ARDL estimates of fiscal reaction function indicate a positive long-run response of primary balance to rising public debt ratio. However, since the size of the

cointegrating slope parameter between revenue and expenditure is significantly less than one, fiscal sustainability exists only in weak form. The weak sustainability implies compliance to IBC in the strict sense but points to difficulties in marketing of future debt.

Though not indicating sustainability in a strong form, our results point to an improvement in the fiscal outlook for South Asia compared to a number of individual country studies. Ejaz and Javid (2011), Mahmood, Arby and Sherazi (2014) relying on an eclectic approach rejected the sustainability hypothesis for South Asian countries. Olekalen and Cashin (1997) for the period from 1951-1998 could not establish a long-run relationship between government revenue and expenditure in the case of India. Jha (2004) rejected the sustainability hypothesis for Nepal (for the period from 1960-1996) and Pakistan (for the period from 1956-1999) in view of the absence of a cointegrating relationship between revenue and expenditure. In contrast to the aforementioned studies, our study finds robust evidences in favour of compliance to IBC by using two alternative strategies. The evidence in favour of cointegration between revenue and expenditure, in contrast to the previous studies, may be attributed to the use of more powerful cointegration tests based on panel data, and to the coverage of fiscal data in the post reform period where governments in the region are taking a more cautious approach towards fiscal management.

To conclude, our results establish that South Asian countries have adhered to their intertemporal budget constraints in the post reform period. However, the sustainability exists only in a weak form which underscores the need to reinforce commitments to long-term fiscal discipline and justifies the ongoing efforts by the countries to strengthen their fiscal positions.

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