

Journal of Economic Cooperation & Development

**Hooman Shababi, Ahmad Jafari Samimi and
Fatemeh Rezai Donchali**

**On the Investigation of the Impact of Cultural
Diversity on the Complexity of Exports in
MENA Countries**

**Abdullah Abdulaziz Bawazir, Mohamed Aslam
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**Gender, Education Levels and Economic
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using Dynamic Modeling**

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Editorial

The latest issue includes eight publications that examine current drivers of economic growth in Asia, South America, and Africa. Much of the research looks at developing nations and delves into economies that can benefit from the following empirical results to drive policy that strives for economic growth. The studies look into culture, gender education, corruption, Islamic banking, Islamic economics education, global markets, macroeconomic trends, and corporate leverage.

In their paper “On the Investigation of the Impact of Cultural Diversity on the Complexity of Exports in MENA Countries,” Hooman Shababi, Ahmad Jafari Samimi, and Fatemeh Rezaei Donechali study the effect that cultural diversity, economic growth, and social experience have on exports in MENA countries. Findings show that cultural diversity in the MENA countries has a positive and significant effect on export complexity and also on export growth. The results suggest that cultural diversity can contribute to increasing economic growth by increasing export complexity. In other words, policies that promote cultural diversity in a country cannot harm its economy, and therefore extreme worries in some countries, due to the cultural differences, are at least economically discredited.

In their paper “Gender, Education Levels and Economic Growth in the Middle East,” Abdullah Abdulaziz Bawazir, Mohamed Aslam, and Ahmad Farid Osman primarily aims to examine gender data in primary, secondary, and tertiary Middle East education on economic growth. Furthermore, the education levels disaggregate by gender to examine their influences on the countries’ economic growth. Analysis by gender reveals that the female education levels are highly positively related to the economic growth compared to the male education levels. The result is in tandem with the policies by the governments towards the enhancement of the involvement of women in the economy by the intensification of the participation of females in the labor force. These findings confirm that governments need to encourage education enrollment rates for both males and females to achieve economic growth.

In their paper “Corruption and Public Debt in Developing Countries: Role of Institutional Quality,” Mariam Naz and Bushra Yasmin suggest that corruption leads to high public debt accumulation in Asian and African

countries; the intensity of this relationship is sharper for the African region than the Asian region. They compute the marginal effects of corruption on public debt at various levels of country-specific institutional quality which reflect the relative standing of each country. They suggest adopting effective measures to combat corruption to reduce public debt burden in both regions. These include a strong judicial system, anti-corruption measures, and GDP bolstering strategies.

In their paper “Benchmarking the Intermediation Costs of Islamic and Conventional Banks: Evidence from Indonesia,” Akhmad A. Susanto, Danes Q. Octavio, and Dyah T.K. Wardani benchmark the intermediation costs of Islamic and conventional banks as measured by net profit or net interest margin. The results indicate no strong evidence that the level of net margin in Islamic banking differs from that in conventional banking. The difference between net margins in the two banking systems is not robust. It is subject to the inclusion of different control variables, the composition of the sample, and, most importantly, outliers.

In his paper “Thoughts on the curriculum for Islamic Economics and Finance Program,” Ahmet TIKTIK suggests adopting a new contemporary curriculum that intersects Islamic principles and history with economic theory and practice (see CORE Econ group). Additionally, he recommends orienting the Islamic economics and finance program around the Maqasid and thus infusing development perspective into the program.

In their paper “Assessing the Effects of COVID-19 on Stock Markets in the GCC Countries: Evidence from Sector-wise Panel Data Analysis,” Hazem Al Samman and Erhan Akkas investigate the effect of the COVID-19 on the stock prices in service, industrial, and financial sectors. The empirical results show that the COVID-19 outbreak has badly hit the stock markets in Saudi Arabia, United Arab Emirates, and Qatar while the stock markets in Bahrain, Kuwait, and Oman are the least impacted countries in GCC. Additional findings confirm that the negative impact of COVID-19 on stock markets in the GCC countries has faded in most sectors due to government support in the latter five months of 2020 and first two months of 2021.

In their paper “Grouping foreign aid and the Multidimensional Poverty Index: a cluster analysis,” José María Larrú , Raquel Ibar, and Carlos Quesada group data on foreign aid, MPI, and public expenditure on education and health. In the first step, the cluster was carried out with six different sectorial foreign aid, closely linked to the ten MPI indicators. In a second step, the clusters were performed among the changes in the ten MPI indicators. In the third step, aid, MPI indicators and public expenditures on education and health were considered. They find remarkable heterogeneity across countries and groups among the aid types allocated on them, all countries belonging to the second group received a significant amount of aid.

In their paper “Determining the Key Factors of Corporate Leverage in Malaysian Service Sector Firms using Dynamic Modeling,” Sitara Karim , Mustafa Raza Rabbani, and Mohammad Ahmar Khan find that firm size, profitability, liquidity, and growth opportunities are the determinants of corporate leverage in Malaysia service sector firms. The results can be useful in practice (for corporations and regulatory bodies); it supports pecking order theory and trade-off theory in terms of explaining the determinants of corporate leverage in Malaysian service firms.

Nebil DABUR
Editor-in-chief

On the Investigation of the Impact of Cultural Diversity on the Complexity of Exports in MENA Countries

Hooman Shababi¹, Ahmad Jafari Samimi² and Fatemeh Rezaei Donechali³

ABSTRACT

Exports play an important role in the global economy. The broad variety of factors affects exports, including cultural diversity, growth, and experience, type of company and export behavior. Among these factors, the factor of cultural diversity was unique and little research was done in this field. The purpose of this study is to investigate the impact of cultural diversity on export complexity. To do so, data of 17 MENA countries including Iran, Bahrain, Egypt, Algeria, Qatar, Saudi Arabia, Syria, Jordan, Yemen, Oman, Morocco, Kuwait, Tunisia, United Arab Emirates, Lebanon, Djibouti, and Sudan were used in Eviews Software during 1985-2015 by applying panel data regression. These countries are almost homogeneous in terms of political and social conditions, culture and customs. The data were extracted from World Health Organization and World Bank. Findings show that cultural diversity in the MENA countries has a positive and significant effect on export complexity and also on export growth. The results suggest that cultural diversity can contribute to increasing economic growth by increasing export complexity. In other words, policies that promote cultural diversity in a country cannot harm its economy, and therefore extreme worries in some countries, due to the cultural differences, are at least economically discredited.

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ملخص

تلعب الصادرات دوراً مهماً في الاقتصاد العالمي. وتؤثر مجموعة متنوعة من العوامل على الصادرات، بما في ذلك التنوع الثقافي، ومستوى النمو والخبرة، ونوع الشركات والسلوك التصديري. ومن بين هذه العوامل، كان عامل التنوع الثقافي فريداً من نوعه ولم يتم إجراء سوى القليل من الأبحاث بخصوصه. ويتمثل الغرض من هذه الدراسة في التحقيق في تأثير التنوع الثقافي على تعقيد عملية التصدير. وللقيام بذلك، تم استخدام بيانات 17 دولة من منطقة الشرق الأوسط وشمال أفريقيا بما في ذلك إيران والبحرين ومصر والجزائر وقطر والمملكة العربية السعودية وسوريا والأردن واليمن وعمان والمغرب والكويت وتونس والإمارات العربية المتحدة ولبنان وجيبوتي والسودان في برنامج Eviews خلال فترة 1985-2015 من خلال تطبيق انحدار بيانات اللوحة. وتبدو هذه البلدان متجانسة تقريباً من حيث الظروف السياسية والاجتماعية والثقافية والعادات. وقد تم استسقاء البيانات من منظمة الصحة العالمية والبنك الدولي. وتظهر النتائج أن لدى التنوع الثقافي في بلدان الشرق الأوسط وشمال أفريقيا تأثير إيجابي وهام على تعقيد عملية التصدير وكذلك على نمو الصادرات. كما تشير إلى أن التنوع الثقافي من شأنه أن يساهم في زيادة النمو الاقتصادي من خلال زيادة تعقيد عملية التصدير. وبعبارة أخرى، لا يمكن للسياسات التي تعزز التنوع الثقافي في بلد معين أن تضر باقتصادها، وبالتالي فإن المخاوف الشديدة في بعض البلدان، بسبب الاختلافات الثقافية، تفقدها على الأقل مصداقيتها الاقتصادية.

ABSTRAITE

Les exportations jouent un rôle important dans l'économie mondiale. Une grande variété de facteurs affecte les exportations, notamment la diversité culturelle, la croissance et l'expérience, le type d'entreprise et le comportement envers l'exportation. Parmi ces facteurs, le facteur de la diversité culturelle est unique et peu de recherches ont été faites dans ce domaine. L'objectif de cette étude est d'examiner l'impact de la diversité culturelle sur la complexité des exportations. Pour ce faire, les données de 17 pays de la région MENA, dont l'Iran, le Bahreïn, l'Égypte, l'Algérie, le Qatar, l'Arabie saoudite, la Syrie, la Jordanie, le Yémen, Oman, le Maroc, le Koweït, la Tunisie, les Émirats arabes unis, le Liban, Djibouti et le Soudan, ont été utilisées dans le logiciel Eviews au cours de la période 1985-2015 en appliquant la régression des données de panel. Ces pays sont presque homogènes en termes de conditions politiques et sociales, de culture et de coutumes. Les données ont été extraites de l'Organisation mondiale de la santé et de la Banque mondiale. Les résultats montrent que la diversité culturelle dans les pays de la région MENA a un effet positif et significatif sur la complexité des exportations et également sur la croissance des exportations. Les résultats suggèrent que la diversité culturelle peut contribuer à augmenter la croissance économique en augmentant la complexité des exportations. En d'autres termes, les politiques qui favorisent la diversité culturelle dans un pays

ne peuvent pas faire de mal à son économie, et donc les inquiétudes extrêmes de certains pays, dues aux différences culturelles, sont au moins discréditées économiquement.

Keywords: cultural diversity, export complexity, economic growth.

JEL Classification: Z1, G1, G15.

1. Introduction

At present, exports play an important role in the global economy. The broad variety of factors affects exports, including cultural diversity, growth, and experience, type of company and export behavior. Among these factors, the factor of cultural diversity was unique and little research was done in this field. Since culture is one of the most important components of development in any country, it is important to know that, until a decade ago, most scholars believed that development had an economic meaning. In other words, development was just an economic aspect, and countries were trying to boost their economy in order to achieve development. But this situation changed with the failure of countries that only put economic criteria into their planning for development and lost the one-dimensional concept of development. It has now become clear that the basis of any development is cultural development; therefore, to achieve comprehensive development, governments must strive to change their perception of man as a cultural being; since, true and sustainable growth is the basis of cultural development and, like the root that feeds on a tree, other sides of development (political, economic and social) also feed on this important dimension. Therefore, it is necessary to attempt to raise the level of the community culture and supply extra effort. (Salehnia et al., 2016).

One of the important aspects of cultural factors is cultural diversity, which is often a concept of cultural diversity and nearly the cultural diversity of different human societies in different regions of the earth. When we talk about cultural diversity, it is not just around cultural differences between countries, and should not be ignored the numerous cultural diversity that exists within countries (Band & Smith, 2015). Cultural diversity can have a positive or negative impact on economic growth. The positive impact can be provided by enhancing the range of skills that can produce a variety of goods and services and the negative impact of the possibility of increasing social discord that leads to increased economic or political instability (Ager & Bruckner, 2013).

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Export complexity is one of the most important affecting factors on the economic growth and development of any country. Export complexity shows the overall efficiency of an export basket of a country by its specialized patterns. Given that each product is identified with a certain level of efficiency, a country is considered a more complicated exporter if the export basket contains higher efficiency products. In formal models, the complexity of a country's export is determined by its economic principles (such as physical capital and human resources, natural resources, and market size). However, Hoosman et al., (2014) found that economic fundamentals are a minor proportion of changes in export complexity. Using a cost discovery model, they believe that the complexity of exports may also be influenced by some unique factors that encourage companies to participate and stimulate cost discovery in an economy. They believe that government policies can play a positive role in forming the structure of economic production (Hoosman Et al., 2014).

A growing number of reports indicate cultural diversity enables a community to be stronger and compete on a larger scale in the global economy in which we live in. People from diverse backgrounds bring language skills, new ways of thinking, innovative ideas and creative solutions to difficult problems.

This study examines the relationship between cultural diversity and export complexity in Mena countries and argues that the degree of cultural heterogeneity and diversity in society can affect the degree of export complexity in the economy. In particular, by stimulating exogenous technology, cultural diversity can encourage more entrepreneurs to examine the underlying cost structure of the economy, which may help to increase the complexity of exports. Also, cultural diversity can increase export growth and improve the country's ability to approach technology (Rivière, 2009).

2. Theoretical Foundations

2.1. Cultural diversity

In each period, a generation is born of individuals who include a continuum of measurement. Each person lives for only two periods and has one father, one mother, and one child. In the first period of life, people are raised by their parents. In the second period of life, people join the workforce. According to the theory of Ashraf and Galore (2011), we assume that people in economics do not have a similar attitude toward dominant cultural diversity norms. Based on the

characteristics of cultural diversity, people can be divided into two groups: compatible or incompatible. Traits of cultural diversity can be transmitted from parents to children. The compatible group is considered to be the most important in the economy and, so the increasing proportion of incompatibles reflects a higher degree of cultural diversity. There are two types of cultural diversity (cultural diversity assimilation and expanding cultural diversity) that have an opposite consequence on the proportion of incompleteness in the economy. The integration of cultural diversity, which represents the internal forces, reduces the incompatibility and, leads to the harmonization of cultural diversity feature. On the other hand, the expanding of cultural diversity, which reflects external forces, increases the incompatibility and thus results in heterogeneity in cultural diversity feature (Thomas, 2014). The culture is vague, multifaceted, dark and indefinable. Many scholars also believe that culture is an ambiguous phenomenon that follows fuzzy logic, not zero and one logic, and therefore the definition of culture has become an easy task, for which there are more than 450 narratives. But today's world requires providing a definition of culture that can make it measurable. Awareness of the existence of culture is a phenomenon shaped by the emergence of the need for an objective human perspective on culture. Previously, culture was an internal phenomenon that one could not isolate and see from a distance (Sirto, 2013).

2.2. Cultural diversity view

There are different perspectives to define culture, three of which are more important than others (Mainela et al., 2015):

Existentialism view

In this view, culture is a combination of structural experiences that is recognizable by living within a particular cultural diversity. In this opinion, culture cannot be defined except through the self-experience that comes from living in that culture. For this reason, any cultural diversity is not understandable to strangers.

Structuralism view

This view emphasizes the constitutive elements in defining culture and believes that culture is the product of dynamic human interaction through the environment to meet the needs that arise at every stage of human social movement in the material and spiritual realms, and manifests as material and

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spiritual values. Material values include human achievements in the material realm such as tools, objects and other achievements that have been discovered or produced. Whereas spiritual values include achievements that are not material, such as values, patterns, standards, theories and ideas, concepts and models. Some cultural diversity phenomena, including the creative arts, fall into both sets of values. In the same sense, we can say that part of human social heritage has a material basis is material culture and that part which has no material basis is spiritual culture (Rastegar & Shaabani, 2016).

Shirvanloo (2011) defines culture as a set of experiences, feelings, and ideas that are contingent on history and are embedded in material and spiritual values, reflecting both the past and the future. In defining culture from a structural view, he defines culture as a system that consists of a core system and four peripheral subsystems. At the core of this system is a dark and unknown field of ontology and cosmology, which seeks to find the correct answer to fundamental human questions such as, who am I, where I come from and where am I going, and to interpret human existence. Myths play an essential role in this field. Human understanding of this field is very defective (Edgar Moren, 2013). In Morin's model, the first peripheral subsystem consists of being that encompasses existential experiences. Art, literature, and philosophy fall into this subsystem. Patterns are another subsystem that encompasses standards, values, traditions, and customs. These are templates that shape human feeling, thought and behavior and provide templates for expressing emotion and thought and behavior. Language is the most important element of culture that shapes thought. And the fourth subsystem is perception and cognition that encompasses all kinds of knowledge (Taghavi et al., 2016).

Functionalism view

This view defines culture based on its functions. Among them, he says, culture is the context in which patterns of thought and behavior are shaped and given to the community and individuals of the community: an identity that is very unique, coherent and distinct, for example, can be distinguished Iranian man from non-Iranian man. Its purpose is to guide human beings to the comprehensiveness, Integrity and existential unity that human beings need that in their interaction with the environment. Above all, culture must be able to help the individual to achieve a dynamic and constructive balance between the inner world and the outer reality in a dynamic and complex environment, in the current complex and crisis-ridden environment. For our purpose, one of these views can be selected

from the definition of culture. In discussing the culture trade and the analysis of the global culture market, it is necessary to adopt a composite, holistic, and systematic view. There is no doubt that in such a discussion, the definition of culture will have a deep effect on its content, discussion direction, and conclusion. The debate on trade and the cultural market has become a heated debate on the issues of cultural economics and the politics of cultural diversity because they deal with the concepts based on our definition of culture. There are four main concepts among these concepts: cultural diversity industries, creative industries, cultural diversity goods and cultural diversity services. There is so disagreement about the definition of these concepts, especially the beginning two concepts that mentioned, and these divergences that are sometimes confusing, and they cast a shadow over the policy and planning of cultural diversity and the quality and evaluation of cultural diversity goods and services and industries (Flow, 2015).

2.3. Cultural Diversity Products and Services

The products of the cultural diversity industries are divided into two groups of cultural diversity goods and services. Cultural diversity goods are consumer goods that carry ideas, symbols, or lifestyles. They are used for educational or entertainment purposes, helping to create collective identities and are the product of individual or collective creativity, subject to intellectual property, and are continually produced and improved through industrial processes and global distribution. Books, movies, magazines, multimedia products, software, music, video, fashion and crafts are examples of these products. Diversity services designed to meet the needs or interests of cultural diversity and they do not represent material goods themselves. They include a set of actions that support cultural diversity provided by the government and private or semi-state institutions or corporations make available to the community (Mainela et al., 2015). Cultural diversity events, art programs, cultural diversity information services, and services such as news agencies, publications, libraries, document centers and museums are of this type. These services offer free or commercial basis. It is so easier to identify and investigate the status of international trade than the world market for cultural diversity goods. Because goods are more tangible, they can set tariffs and customs duties upon entering the country. But culturally diverse services are provided in each country or organization in a specific way, and their international currency cannot be registered, moreover, they cannot be defined by unique rules. However, at the World Trade

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Organization, Gates has attempted to partially cover this diversity and regulate international trade services. In general, cultural diversity services can include program services (performing theatre and circus programs, etc.), publishing services, news services, communication services, architectural services, media services (dubbing and distribution of films and radio programs, television and home media), and all support services for the production of cultural diversity goods, such as print, copy, film, cable, satellite, radio and television broadcasting services (Rahimnia, 2014).

2.4. Economic Complexity and Export Complexity

Based on this thought, the amount of knowledge formed in a country is the most important factor that determines the extent of the development of that country. Knowledge means the information that is the result of the experience that is, how things are done in practice and experience that is fundamentally different from theoretical and scientific information. Knowledge transfer is not easy and based on long term experience. This group's approach is very significant in quantifying the whole concept of countries' knowledge. According to the analysis of this group, the country's knowledge is directly related to the types of products manufactured there. The best available data from the countries of production is the export statistics of the countries, obtained from the United Nations Commodity Trade Statistics Database⁴. The definition of product variety as the number of exported goods per country is very simplistic and does not provide useful information. The beauty technique is used to define goods variety. The index of economic complexity can be considered as a specific definition for the goods variety that is defined based on the type of valuation for each commodity (Rastgar & Shaabani, 2016).

In a simple definition, the index of economic complexity of any country is a value average of its export goods. The value of each commodity is calculated based on two simple factors: 1_ by the number or variety of countries that produce and export that commodity (We call it the goods production scattering), 2_ by the value of other commodities export. The value that can be put into the equation by the number of skills and knowledge required to manufacture products. The value that is represented the complexity of the production of

⁴ This information has been collected by various organizations such as the World Health Organization (WHO), the International Labor Organization (ILO), the UNICEF and the FAO.

goods. To determine the fair value of certain mineral commodities such as diamonds and gold, which are exported by a few countries but do not require much knowledge in calculating the value of each commodity, In addition to the number of countries exporting this product, the variety of export commodities and the value of other commodities are also taken into account, and so it is calculated the value of other commodities, the distribution of their production, and the export diversification of the countries that export that commodity and the value of other commodities produced. This calculation is done mathematically and continues until it reaches to a converging number (Ranjbar, 2013).

2.5. Cultural diversity and economic complexity and export complexity

Studies show that export complexity is important for economic growth. In the context of cost discovery theory, cultural diversity can also affect the degree of export complexity. Cultural diversity helps increase the number of entrepreneurs involved in the cost discovery process and enhancing the prospects for innovation, thereby driving economic technology forward and increasing export complexity. Besides, cultural diversity can boost export growth by improving the economic ability to approach its technology frontier.

3. Research Background

Table 1: Overview of Overseas Research Background

The writer	Print year	Topic	Description
Fan et al.,	2018	Cultural diversity and export complexity	The results show that the impact of cultural diversity on the growth rate of export complexity is statistically unstable, and the annual impact of cultural diversity on the complexity of exports is not very important too.
Pappas	2017	Export Complexity and Formulation of the consumer experience in a Sharing Economy	Three configurations are capable of affecting the overall experience: (I) the status of the quality relationship, (II) the risk perspective, and (III) the social interaction.
Waldme	2016	The Impact of Economic Complexity and Culture on the Gross Income of Chinese Cities	From the method of Hassmann (2007) for each of the Chinese cities, a complexity index was calculated and estimated using a model of econometric hybrid data, a model

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The writer	Print year	Topic	Description
			with 200 cities (as cross-sectional data). Their results showed that cities with more complex manufacturing structures experienced higher growth rates.
Erkan	2015	Economic complexity and export competitiveness in Turkey	Exports consist of the most advanced products in developed countries. This means that countries have high export competitiveness. Given its export share of high-tech exports, it seemed that Turkey is probably well below its level. This makes it almost an indicator of low economic complexity and low export competitiveness.
Yang	2015	Cultural Diversity and Its Role in Export Complexity and Business Process Improvement	Organizational and management dimensions should be taken into account to achieve cultural synergy in export complexity, and the results also show that cultural diversity affects export complexity and business process improvement.

Reference: Literature Review

Table 2: Overview of Inland Research Background

The writer	Print year	Topic	Description
Norozi & Hassanpour	2018	A Case Study on the Impact of Productive Capabilities on the Complexity of Non-Oil Exports, Case Study of Developing Countries	1. Capacity building components are not the same in the export complexity of developing countries in terms of income levels, average and high and low. 2. Foreign direct capital inventory variable was the only factor that had a significant impact on export complexity in all three countries.
Ahmadian et al.,	2018	Economic complexity, a new approach to measuring the commercialization of scientific and technological products	Understanding the economic complexity approach and its application can help to assess the knowledge, skills and trends of the economies of countries. The results show that the use of economic complexity index can be a valuable way to measure the

The writer	Print year	Topic	Description
			success of theoretical and technical knowledge in applied and scientific fields for the attention of policymakers and authorities.
Mottaghi	2017	Factors of Economic Complexity Affecting Immigration in Iran; Emphasis on Income and Unemployment Indicators	The Gross domestic product indices (GDP), unemployment and good governance index are the main factors affecting the rate of emigration from Iran. Meanwhile, reducing unemployment, increasing GDP, and improving the index of good governance are led to a reduction in the rate of immigration from Iran, which confirms the theories of functionalists, developmental and structuralisms for Iran.
Taghavi and Salari	2016	The complexity of Non-Oil Exports and Foreign Direct Investment (FDI) (Case Study of Developing Countries with Emphasis on Iran)	Foreign Direct Investment (FDI) has a significant relationship with the index of non-oil exporting complexity in developing countries. This finding has important lessons for Iran, Including increasing the complexity of non-oil exports through foreign investment attraction policies.
Salehi et al.,	2016	Investigating the factors affecting the export of cultural goods and presenting management strategies	Exports of cultural goods to countries with negative economic growth are higher.
Kalantari et al.,	2015	Cultural diversity and national cohesion in Iran	The continuity and sustainability of a society's social, political and cultural life depend on the coherence and solidarity between the constituent elements. Iran is a multi-ethnic society and although Iranian ethnicities have different histories and characteristics, their Iranian identities have always been based on ethnic affiliations and form national cohesion in the country.

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The writer	Print year	Topic	Description
Salimifar	2015	The Impact of Economic Complexity Index on Economic Growth in the Top 42 Countries in Science Production	The results show that the use of panel data in estimating the study model is not appropriate and has a significant positive effect on economic growth in the model estimation based on cross-sectional data of the countries under study.
Manafi et al.,	2014	Globalization, Cultural Diversity and the need for Global Citizenship Education	Certainly, the world will not prosper unless it is through cooperation, participation, a sense of moral responsibility for each other and having a sense of tolerance towards each other, acquire scientific skills and technological development of group skill which cannot be achieved except to Global Citizenship Education
Rezghi & Omrani	2013	Strategies for Expanding the Export of Cultural Diversity Products in the Age of Globalization	Laws and regulations and business liberalization are positive about the components of recognizing global markets and common marketing tools, which, calculated based on trade liberalization In the first place, recognizing world markets in second place, laws and regulations in Third Place and finally, the common marketing tools is in fourth place.

Reference: Literature Review

4. Research methodology

This research methodology is based on the goals of the applied type and the basis of archiving data collection and is a descriptive correlational research field in terms of research design. The statistical population of the study is the MENA countries as panel data (1985–2015) for 17 countries in the Middle East and North Africa, MENA (Iran, Bahrain, Egypt, Algeria, Qatar, Saudi Arabia, Syria, Jordan, Yemen, Oman, Morocco, Kuwait, Tunisia, United Arab Emirates, Lebanon, Djibouti, Sudan). These countries are almost homogeneous in terms of political, social, cultural and customs conditions. This data was extracted from

the World Health Organization (WHO) and World Bank databases. It is a panel study of MENA countries that had long term series (31 years) and long sections (17 countries). In this study, panel data regression was used in Eviews 9.0 software to test research questions.

5. Results and Discussion

5.1. Data description

Table (3) is about the descriptive statistics of all the information collected that including of average, median, the maximum and minimum values, standard deviation, the skewness and elongation of each variable for 17 countries selected during the period 1985-2015.

Table 3: Descriptive statistics of data for each of the research variables

Statistical features	Export complexity	Cultural diversity	Growth	Level of economic development	Innovation	Human Capital	The country size	Foreign Direct Investment (FDI)
average	0.74	1.914	3.89	49.06	6.15	0.95	1.18e	76.81
median	0.75	2.03	3.92	38.23	5.69	0.45	33628571	79.8
maximum	1.26	3.05	14.16	196.21	9.65	9.32	1.34e	88.2
minimum	0.054	1.02	-14.74	23.02	0.066	0.009	436300	13.2
standard deviation	0.207	0.69	4.21	35.25	1.79	1.23	2.79e	12.02
skewness	-0.295	0.22	-0.67	1.63	0.14	2.4	3.57	-2.3
elongation	2.55	1.22	5.49	4.74	2.61	9.78	14.46	9.5

References: Author's Calculation

Descriptive statistics and correlation coefficients are shown in Table (3). The maximum and minimum values of cultural diversity index are 3.05 and 1.02, respectively. The standard deviation is 0.69, indicating that cultural diversity in the 17 countries in our sample is not significantly different. Also, the average and median values are 2.03 and 1.92, respectively. This means there are no significant exemptions. In the case of export complexity, the range of maximum and minimum values (the gap between maximum and minimum values) is also not very large. For example, the variable of cultural diversity, the standard deviation of the export complexity variable in our sample is also low, indicating that there are no large differences between countries. Besides, the values are intermediate and close to each other, it means that the drop will eliminate them.

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5.2. Stability Test

In this study, The Levin, Lin, and Chu's tests (LLC) were used. The results showed that in the combined data, the use of the unit root test for these data has more power of test than the use of the single root test for each cross-section. The results of the Levine, Line, and Chu (LLC) stability are presented in Table 4. The results show that all of the variables are not stable except for the level of economic development, human capital, and size of the country which is stable at the level. The other variables in question zero of this test are not verified for having a single root and instability and are stable.

Table 4: LLC Unit Root Test Results for Model Variables

Variable	Statistics value	P-Value	Result
EXPY	-2.063	0.0196	I(0)
GR	-9.073	0.0000	I(0)
FDI	-3.297	0.0005	I(0)
PCGDP	-7.656	0.0000	I(1)
CDI	-4.652	0.0000	I(0)
KEI	-4.538	0.0000	I(0)
POP	-21.576	0.0000	I(1)
HC	-18.569	0.0000	I(1)

References: Author's Calculation

5.3. Correlation Test

Before estimating the model, the correlation test was performed to ensure no collinearity between explanatory variables. The results are presented in Table (5).

Table 5: Results of correlation test

Variable	EXPY	GR	PCGDP	KEI	POP	HC	CDI	FDI
EXPY	1.000	0.283	0.320	-0.852	-0.172	0.499	0.199	0.1415
GR	0.283	1.000	-0.407	-0.146	-0.177	0.515	0.282	0.2421
PCGDP	0.320	-0.407	1.000	-0.296	0.293	0.591	0.424	0.1994
KEI	-0.852	-0.146	-0.296	1.000	0.003	-0.371	0.215	0.2131
POP	-0.172	-0.177	0.293	0.003	1.000	-0.344	0.005	0.1475
HC	0.499	0.515	0.591	-0.371	-0.244	1.000	0.09	0.3527
CDI	0.199	0.282	0.424	0.215	0.005	0.09	1.000	0.4632
FDI	0.1415	0.2421	0.1994	0.2131	0.1475	0.3527	0.4632	1.000

References: Author's Calculation

According to Table (5), as respects the coefficients are less than R2 radicals, the collinearity between the explanatory variables used in the research model is incomplete and insignificant.

5.4. Pattern estimation results

In the present study, to test the questions, the general model is presented as follows:

$$EXPY_{i,t} = \alpha + \beta_1 * GR_{i,t} + \beta_2 * PCGDP_{i,t} + \beta_3 * KEI_{i,t} + \beta_4 * POP_{i,t} + \beta_5 * HC_{i,t} + \beta_6 * FDI_{i,t} + \beta_7 * CDI_{i,t} + \varepsilon_{i,t} \quad (1)$$

The above static econometric model can be written dynamically:

$$EXPY_{i,t} = \alpha + \beta_0 * EXPY_{i,t-1} + \beta_1 * GR_{i,t} + \beta_2 * PCGDP_{i,t} + \beta_3 * KEI_{i,t} + \beta_4 * POP_{i,t} + \beta_5 * HC_{i,t} + \beta_6 * FDI_{i,t} + \beta_7 * CDI_{i,t} + \varepsilon_{i,t} \quad (2)$$

Where $EXPY_{i,t}$ is the export complexity of country i in year t , which is used to measure its efficiency index, $EXPY_{i,t-1}$ is also the export complexity of country i in year $t-1$, $GR_{i,t}$ is i 's export growth at time t , which used as a percentage of GDP changes, HC_i is the human capital of the country i at year t , $KEI_{i,t}$ represents the innovation of the country i in year t , $POP_{i,t}$ is the size of the country i in year t which calculated based on population size., $PCGDP_{i,t}$ is the level of economic development of the country i in year t , which is expressed as a percentage of GDP for each country, FDI denotes foreign direct investment and CDI denotes cultural diversity, respectively.

In estimating this model, as regards variables data are provided at annual intervals, we also used estimates annually.

Table 6: Results of pattern estimation

Variable	Coefficient	t-Statistics	P-Value
EXPY	682619.0	75731.16	0000.0
GR	224507.0	13040.3	0019.0
PCGDP	767785.0	894215.4	0000.0
KEI	573572.0	703661.2	0072.0
POP	504554.0	37060.11	0000.0
HC	651741.0	841846.5	0400.0
CDI	352641.0	325429.6	0051.0
FDI	562213.0	67785.12	0200.0
J-Statistics	14.5174		
J-Statistics Possibility	0.752734		
Instrumental variable rank	18		

References: Author's Calculation

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According to Table 6, it was concluded in the period under review that interruption of export complexity at the 99% confidence interval had a significant effect and could be either positive on the Current value of exports. Also, cultural diversity with a 99% confidence interval had a positive and significant effect on export complexity in the selected countries in the period 1985–2015, which increased 1 unit of cultural diversity and 0.325 units of export complexity. Therefore, the question of this study based on the positive effect of cultural diversity on export complexity cannot be ruled out.

Economic growth at the 99% confidence interval also had a positive and significant effect on the degree of export complexity in the spatial and temporal periods, which increased 1 unit of cultural diversity and 0.224507units of export growth. Therefore, the question of the study based on the positive effect of cultural diversity on export rates growth cannot be ruled out.

On the other hand, human capital at the 99% confidence interval had a positive and significant effect on the degree of export complexity in the selected countries during the period 1985- 2015, which increased 1 unit of human capital and about 0.652 units of export complexity.

Also, according to the probability and t-statistic of the coefficients of innovation and size of the country of direct foreign investment, the 99% confidence interval had a significant positive effect on export complexity in the selected countries during the period 1985–2015.

Wald test: This test is calculated to evaluate the validity of the coefficients. Based on the test, the questions zero of the coefficients are rejected. Therefore, the entered variables have enough validity. The results of the Wald test are shown in Table 7.

Table 7: Results of the Wald test

Test statistics	value	Possibility
F-statistic	8943.134	0000.0
The statistic of χ^2	3659.809	0000.0

References: Author's Calculation

Sargan test: The Sargan test has χ^2 distribution and is defined by the following relation:

$$J\text{-statistic} = \chi^2(r - k) \quad (3)$$

In the above relation, r is the instrumental variable rank, k is the number of estimated variables, J -statistic is the same as statistic J , and χ^2 is a statistic of Chi-square test related to the Sargan test. According to the above equation, the Sargan test statistic value is 0.764, and the J -statistic probability is about 0.753. Therefore, the zero question of whether the matrix tool is valid is not rejected. In other words, there is no strong correlation between the defined instrument variable (second interruption of export complexity variable) and the dissolution sentence.

6. Conclusions and Suggestions

Cultural diversity has good and bad aspects for each country. It can be good, in case of compatibility and it can be bad, in case of incompatibility. This potential can be beneficial to each country, if policy makers try to make it compatible and control it toward country's interests. One of the main usages of compatible cultural diversity is its effects on economic growth and economic complexity. Cultural diversity can lead to various goods and services which can complex the export format of countries. Complex exports mean higher competitive advantage and also higher GDPs. Due to the importance of the issue discussed in previous sentences, the following research tried to investigate the effect of cultural diversity on economic and export complexity. The sample of the study includes 17 MENA region countries with homogeneous economic structures. To do so, panel data regression was used in Eviews software.

Using random regression plotting and considering its effects, there is a significant statistical relationship between cultural diversity and exportability. The index of economic complexity of each country is an average of the values of its export goods. The value of each commodity is simply determined by the following: 1- The number or variety of countries that produce and export that commodity (which we call the distribution of commodity production). 2- Based on the value of other exported commodity in those countries. The value used for the number of abilities and knowledge required to produce the goods in the equation, and the value represents the amount of commodity production complexity. It is argued that commodities produced by few countries have more complex commodities. And, against of commodities produced by many countries, they require less and simpler capabilities and knowledge. To determine the fair value of certain mineral commodities such as diamonds and gold which are exported by a few countries, but whose production does not require much knowledge, in calculating the value of each commodity, in addition

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to the number of countries exporting that commodity, the variety and value of export commodities of those countries are also taken into account. And so is recalculated recursively the value of other commodities, the distribution of their production, and the variety of export cultures of the countries which export that commodity and the value of the other commodities they produce. Economic complexity is a measure of the computation of knowledge and skill in society that is achieved through the commodity in which society is produced, because its associated ideology is based on the assumption that if a product requires a particular type of knowledge and skill, then it can be the result that the producing countries need the knowledge and skill needed to produce that product. Since economic complexity is used to express countries' ability to produce advanced goods by providing appropriate structures for human interaction to gather productive knowledge and its practical application, it can pave the way for identifying how successful the commercialization of science and technology products is in countries' economies. The results indicate that the impact of cultural diversity on the complexity of exports on a year-to-year basis is significantly different, but this effect increases over long periods. In other words, with increasing cultural diversity, export complexity is enhanced. The coefficient of variation of cultural diversity has a positive and significant effect which shows this variable has a direct effect on export complexity. The research results of Norozi & Hassanpour (2015), Taghavi & Salari (2016), Salimifar(2015), Rezghi & Omrani (2013), Fan et al., (2018) and Yang (2015) are in a line and are aligned.

It is necessary to know that until a few decades ago, most experts believed that development had an economic meaning in the growth rate of exports; in other words, development was only an economic aspect, and countries had to strengthen their economies to achieve development. But that was changed by the breakdown of countries that included only export growth rate measures in their planning to achieve growth and lost the one-dimensional concept of development. It is now clear that the basis of all development is the development of cultural diversity; therefore, governments should be ready to change their attitude towards human beings as an element of cultural diversity to achieve comprehensive development. Because it is the basis for sustainable development of cultural development, and as the root that nourishes the tree, the other aspects of development (political, economic and social) are also nurtured from this important dimension. Therefore, it is necessary to strive to increase the level of the cultural diversity of the community and to put in the double effort. Also,

cultural diversity can help accelerate export growth. In other words, policies that promote cultural diversity in one country cannot harm the economy, so worries in some countries, due to the cultural differences, are at least in terms of the rate of export growth is discredited. The research results of Ahmadian et al., (2018), Salehi et al., (2016), Manafi et al (2014), Pappas (2017) and Waldme (2016) are in a line and are aligned.

The economy based on cultural diversity is an economic axis based on production, and distribution and application of knowledge and information to realize export growth and increase productivity. The development of this economy requires the simultaneous optimization of a set of industrial policies, basic science development policies, and technology development policies, which of course require appropriate institutions. Therefore, the emphasis on cultural diversity is not only the production and distribution of knowledge and information, Instead, but they are also important to apply, meaning the effective use and application of different types of culture in all economic activities. It is clear that applying cultural diversity in production can increase the share of export growth in production. Undoubtedly, the leadership, organization, planning and implementation of science and technology development programs are recognized as the main export complexity of any country in today's world which known as science and technology policymaking, accordingly, the effective use of science and technology will drive economic growth and social development. Accepting the above principle, It turns out that the country's major development policies should be designed to make science and technology policy as their first and foremost issue. Studies show that cultural diversity is a valuable treasure for individuals and communities. Protection, promoting and preserving cultural diversity is a guarantee of sustainable development that benefits for current and future generations, as well as, exports complexity is important for economic growth. In this study, the theoretical framework shows that cultural diversity can also affect the degree of export complexity. Cultural diversity helps to increase the number of entrepreneurs involved in the cost discovery process, which enhances the vision of innovation and thus drives technology economics forward, and it also can increase export complexity. Besides the above, cultural diversity can also boost export growth by improving the economic ability to reach its technological frontier.

Since cultural diversity has a positive impact on the degree of export complexity, it is suggested:

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- ✓ Let's move on to developing export by expanding areas of cultural diversity. Providing the contextual factors that influence on cultural diversity, such as the development of the communication space and the spread of information technologies in society.
- ✓ First, organizing the theory of the relationship between cultural diversity and export complexity, and then, by contributing to the degree of heterogeneity in society, cultural diversity can influence on the degree of export complexity in the economy.
- ✓ In particular, by stimulating foreign technology, cultural diversity can encourage more entrepreneurs to examine the basic cost structure of the economy, which may help increase the complexity of exports.

Since cultural diversity has a positive impact on export growth, it is suggested:

- ✓ The impact of cultural diversity on export growth depends on the stages of economic development. The early stages of economic growth include the growth of the agricultural sector; Countries with lower cultural diversity have tended to have relatively high levels of human capital to enable them to work effectively across their production frontiers.
- ✓ For this reason, export managers are advised to pay particular attention to cultural diversity and improve the ability of nations to reach the technological frontier.

References

- Ahmadian, Mohammad Mehdi, Aghajani, Hasanali, Shirkhodaei, Meysam and Tehranchian, Amir Mansur. (2018). Economic complexity, a new approach to measuring the commercialization of scientific and technological products. *Alee, Iranian Journal of Science and Technology*, 8 (4), 4, 51-77.
- Taghavi, Mehdi and Salari, Yusuf. (2016). The complexity of non-oil exports and foreign direct investment (FDI), (Case Study of Developing Countries with Emphasis on Iran). *Journal of Financial Economics*, 10, (36), 1-14.
- Rezghi, Hadi & Omrani, Mohammad Hussein. (2013). Strategies for Expanding the Export of Cultural Goods in the Age of Globalization. *Journal of Strategic Studies of Public Policy*, 4 (11), 72-41.
- Rastegar, F. Shaabani, h. (2016). The impact of the Diverse Dimensions of Hofstede Culture on Customer confidence in online shopping through customer perception of the company. *Organizational Culture Management*, 1 (12), 105-123.
- Ranjbar, A. (2013). Cultural diversity in consumption and its relation to patriotism and Globalist Tendencies among the students of Isfahan, *Journal of Business Management*, 1 (3), 23-45.
- Salimifar, Mustafa (2015). Investigating the Impact of Economic Complexity Index on Economic Growth in the Top 42 Countries in Science Production. *Journal of Economics and regional development*, 2 (10), 60-90.
- Salehi, Seyed Reza, Kavosi, Esmail, Taghadosi, Pooran Dokht. (2016). Investigating the Factors Affecting the Export of Cultural Goods in Iran and providing management strategies. 4 (9), 73-93.
- Kalantari, A, Ahmadi, M. and Hassani, M. (2015). Cultural diversity and national cohesion in Iran, *Iranian Journal of Management Science*, 2 (7), 81-95.
- Mottaghi, M. (2017). The Influence of Economic Complexity Factors on Immigration in Iran; Emphasis on Income and Unemployment Indicators, *Journal of Knowledge and Development (Scientific & Researchical)*, 21, 97-103..
- Norozi, M. and Hassanpour, b. (2018). The Impact of Generating Capabilities on the Complexity of Non-Oil Exports. Case study of developing countries, *Journal of Business Management*, 3 (1), 67-86.

22 On the Investigation of the Impact of Cultural Diversity on the Complexity of Exports in MENA Countries

Ager, M., and D. Brückner. (2013), “The Impact of Terms of Trade and Real Exchange Volatility on Investment and Growth in Sub-Saharan Africa”, *Journal of Development Economics*, 65, 491–500.

Ashraf, H. B, Galore, S. (2011), “Growth, productivity and diversification in Africa”, *Journal Productivity Analysis*, 33, 125-146.

Asian, G. (2016), “On Exports and Economic Growth”, *Journal of Development Economics*, 12 (1), 59 -73.

Bahar, N., Ghosh, A. R., and J. Ostry. (2014), “Export Instability and the External Balance in Developing Countries”, *IMF Staff Papers*, 41, 214–235.

Baltagi, C. A. (2008). The building blocks of economic complexity. *Proceedings of the National Academy of Sciences*, 106 (26), 10570-10575.

Band, R. and Smith H. L. (2015), “Export Variety and Country Productivity”, NBER Working Paper 10830, National Bureau of Economic Research: Cambridge MA.

Cezinketa, C. L. (2010). Factors Influence Development of E-Banking in Malaysia. *The Journal of Internet Banking and Commerce*, 2 (3), 135.

Erkan, K. (2015). Economic Complexity and Export Competitiveness: The Case of Turkey. *Procedia - Social and Behavioral Sciences*, 195 (2015), 524 – 533.

Fan Z., Anwar S. & Huang S. (2018). Cultural diversity and export sophistication, *International Review of Economics and Finance*, doi: 10.1016/j.iref.2018.05.008.

Green, G. J. (2008). *Cultures And Organizations: Software Of The Mind: [Intercultural Cooperation And Its Importance For Survival] (Rev. And Expanded 2nd Ed.)*. New York: McGraw-Hill.

Hansen, M. E., Singleton, V. D. (1982). Comparison of SCImago journal rank indicator with journal impact factor. *The FASEB Journal*, 22 (8), 2623-2628.

Hansen, N, Hidalgo, M & Ming, L. (2014). *The Atlas of Economic Complexity, Mapping paths to prosperity*, MIT Media Lab.

Hansen, S. (1982). A Simple Measure of Economic Complexity. *ArXiv preprint arXiv: 1601.05012*.

Hsiao, D. (2011), “What does Export Diversification do for Growth? An Econometric Analysis”, *Applied Economics*, Vol 38 (15): pp1825-38.

Khademi, T., Ismail, K., Lee, C. T., & Garmsari, M. (2015). The Role of Potential Licensee Availability in Facilitating Commercialization of Academic Research Results. *Procedia-Social and Behavioral Sciences*, 172, 331-335.

Navarro, L., Heyns, M., & Rothmann, S. (2013). Dimensionality of Trust: An Analysis of the Relations between Propensity, Trustworthiness and Trust. *SA Journal of Industrial Psychology*, 41(1), 1–12.

Pappas, N. (2015). The complexity of consumer experience formulation in the sharing economy. *International Journal of Hospitality Management*, 28 (3), 854–862.

Powell, G. (2017), “From Coffee Beans to Microchips: Export Diversification and Economic Growth in Costa Rica”, Selected Paper prepared for presentation at the Southern Agricultural Economics Association Annual Meeting, Atlanta, Georgia, January 31–February 3.

Rivière, F. (Ed.). (2009). *Investing in cultural diversity and intercultural dialogue* (Vol. 2). UNESCO.

Sirto, C. A. (2013). The product space conditions the development of nations. *Science*, 317(5837), 482-487.

Thomas, H. (2014), “Structural Change and Development Policy”. New York: Oxford University Press.

Waldme, M. (2016). The effect of economic complexity and culture on the gross domestic product growth of Chinese cities, *CroEconSur*, 13 (1), 23-32.

Wilhelms, M.P., Merfeld, K., Henkel, S., (2017). Yours, mine, and ours: a user-centric analysis of opportunities and challenges in peer-to-peer asset sharing. *Bus. Horiz*, 60, 771–781.

William, B. (1990). *Personal Identity, National Identity And International Relations*", Cambridge University Press.

Gender, Education Levels and Economic Growth in the Middle East

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ABSTRACT

This study primarily aims to examine the effect of three education levels namely primary, secondary and tertiary on economic growth in the Middle East countries. Furthermore, the education levels disaggregate by gender to examine their influences on the countries' economic growth. Accordingly, the study employs the static panel data models namely pooled ordinary least squares model, random effects model, and fixed effects model on ten Middle East countries, for the years 1996 to 2018. Based on the findings, secondary and tertiary education both have significant and positive influence on the economic growth. Analysis by gender reveals that the female education levels are highly positively related to the economic growth compared to the male education levels. The result is in tandem with the policies by the governments towards the enhancement of the involvement of women in the economy by the intensification of the participation of females in the labor force. These findings confirm that governments need to encourage education enrollment rates for both males and females to achieve economic growth. Briefly, the most important policy recommendation to the government is to position human capital development at the center of its development strategy.

ملخص

تهدف هذه الورقة في المقام الأول إلى دراسة تأثير ثلاثة مستويات تعليمية، أي الابتدائي والثانوي والعالى على النمو الاقتصادي في دول الشرق الأوسط، بالإضافة إلى تصنيف مستويات التعليم حسب النوع الاجتماعي لدراسة تأثيرها على النمو الاقتصادي للبلدان. وبناء على ذلك، استخدمت الورقة نماذج بيانات اللوحة الثابتة

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وهي نموذج المربعات الصغرى العادية المجمعة، ونموذج التأثيرات العشوائية، ونموذج التأثيرات الثابتة في عشر دول من الشرق الأوسط، للأعوام من 1996 إلى 2018. واستنادا إلى النتائج، فإن لدى التعليم الثانوي والعالي تأثيرا كبيرا وإيجابيا على النمو الاقتصادي. ويكشف التحليل حسب النوع الاجتماعي أن مستويات تعليم الإناث مرتبطة بشكل إيجابي للغاية بالنمو الاقتصادي بالمقارنة مع مستويات تعليم الذكور. والنتيجة تتماشى مع سياسات الحكومات الهادفة إلى تعزيز مشاركة المرأة في الاقتصاد من خلال تكثيف مشاركة الإناث في القوى العاملة. وتؤكد هذه النتائج أن الحكومات بحاجة إلى تشجيع معدلات الالتحاق بالتعليم لكل من الذكور والإناث لتحقيق النمو الاقتصادي. وباختصار، تتمثل أهم توصية سياسية للحكومات في وضع تنمية رأس المال البشري في قلب إستراتيجيتها التنموية.

ABSTRAITE

Cette étude vise principalement à examiner l'effet de trois niveaux d'éducation, à savoir le primaire, le secondaire et le tertiaire, sur la croissance économique des pays du Moyen-Orient. En outre, les niveaux d'éducation sont ventilés par sexe afin d'examiner leurs influences sur la croissance économique des pays. En conséquence, l'étude utilise les modèles de données de panel statiques, à savoir le modèle des moindres carrés ordinaires regroupés, le modèle à effets aléatoires et le modèle à effets fixes sur dix pays du Moyen-Orient, pour les années 1996 à 2018. D'après les résultats, l'enseignement secondaire et l'enseignement supérieur ont tous les deux une influence significative et positive sur la croissance économique. L'analyse par sexe révèle que les niveaux d'éducation des femmes sont fortement liés à la croissance économique par rapport aux niveaux d'éducation des hommes. Ce résultat va de pair avec les politiques des gouvernements visant à améliorer l'implication des femmes dans l'économie par l'intensification de la participation des femmes à la population active. Ces résultats confirment que les gouvernements doivent encourager les taux de scolarisation des hommes et des femmes pour atteindre la croissance économique. En bref, la recommandation politique la plus importante pour le gouvernement est de placer le développement du capital humain au centre de sa stratégie de développement.

Keywords: Gender, Education levels, Economic growth, Middle East, Panel data.

JEL Classification: C33, I21, I25, O1, O4

1 Introduction

The attention of economists began to focus on human capital since the 1960s (Schultz 1961, Becker 1964, Bowman 1966, Denison 1967).

Schultz (1961) reported that the growth in human capital led to a great increase in American per capita income in the early decades of the 20th century. In the late 1960s, Denison (1967) revealed that two-thirds of growth is due to advances in educational attainment and knowledge in the economies of the United States and Western Europe.

The fast growth in East Asia economies has led to considerable attention on human capital and education. Economies, such as Singapore, Korea, Taiwan, and Hong Kong, have attained unmatched economic growth rates while making great investments in education. Education can contribute to economic growth through its impact on research expansion, enhancing knowledge, skills, technological progress, and productivity (Romer 1989). Moreover, many studies have confirmed the importance of education in boosting human capital, which can be considered by many as the future necessary condition for development (Benhabib and Spiegel 1994, Stevens and Weale 2004). Wolff and Gittleman (1993) noted that education in developing countries is one of the leading sectors for investment to boost economic growth and sustain poverty alleviation. Accordingly, investment in education is vital to produce a high quality and productive workforce that contributes towards economic growth.

The present study is unique in that it minimizes the gap in literature among studies dedicated to examining the effects of male and female education on economic growth in the Middle East countries. Most studies are done at the aggregate levels of education without much consideration of the relative effects of male and female education. Therefore, it will be interesting to examine the influence of male and female education on economic growth as well as to see whether males or females will significantly contribute to the growth. This study may be helpful for the policymakers in the Middle East countries to realign their budget strategy towards education for better educational attainment in an attempt to attain higher levels of economic growth. The study also contributes to relevant literature, pertaining to Middle East countries.

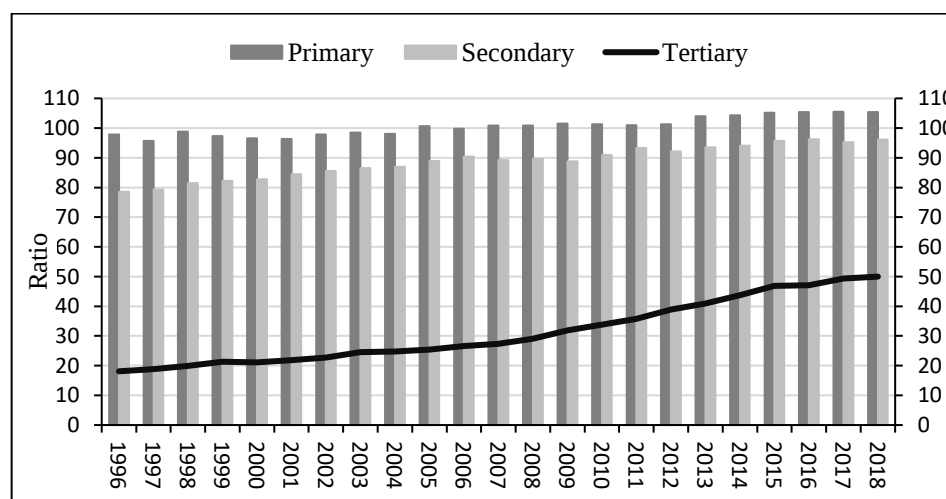
Therefore, the objective of this article is to investigate the impact of three main education levels –primary, secondary, and tertiary – on economic growth. This study also focuses on the investigation of the effects of male and female education on the Middle East countries' economic growth. The structure of the study is determined as follows. The next section presents overview of gross enrollment ratio. Section 3 reviews the extant literature. Model specifications, estimation approach, variables, with sources of data provided in Section 4, and the results presented in Section 5, while the last section presents the conclusions.

2 Overview of gross enrollment ratio

The UNESCO definition of the gross enrollment ratio is described as the number of enrolled students in a specific education level, notwithstanding the age, over the age group population corresponding to the education level. In some cases, the enrollment ratio can exceed 100%, which means that it includes the enrollment of those students whose ages do not match suitable levels.

Under this section, the gross enrollment ratio evolution is analyzed in the education levels examined. Such ratio is depicted in Figure 1 in the context of the Middle East for years spanning from 1996 to 2018. Overall, the gross enrollment ratio for all levels of education has increased over the years. A small disparity is displayed by the figure between the primary and secondary enrollment ratio. Meanwhile, there is a significant disparity between the secondary and tertiary enrollment ratio. The difference has remained fairly constant during the period. This indicates that tertiary education is substantially lagging behind other education levels in the Middle East countries.

Figure 1: Gross enrollment ratio for education levels, 1996-2018

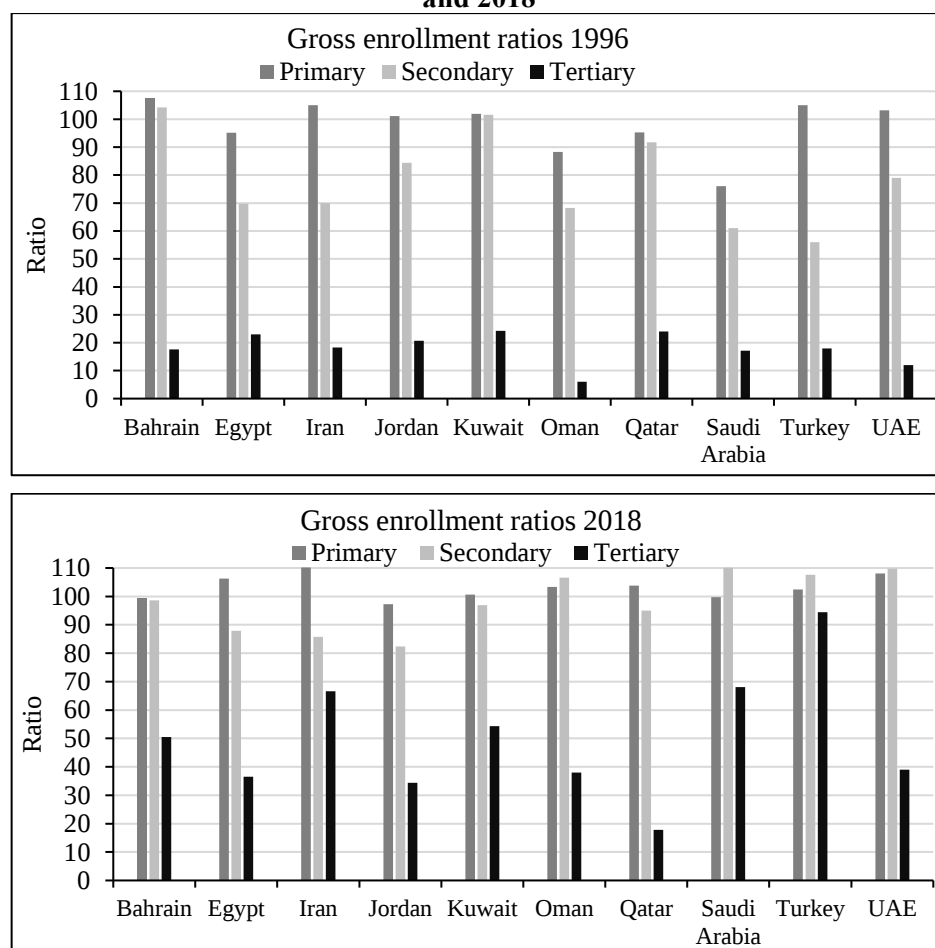


Source: World Bank (2020).

Figure 2 presents gross enrollment ratio by country. In the primary level, the gross enrollment ratio in the Middle East states raised by 7.70% from 1996 to 2018. This performance, however, hides disparities between countries (Figure 2). For some countries, the primary enrollment ratio rose

more than the average. This is essentially the case for Saudi Arabia, Oman, Egypt, and Qatar, where the primary enrollment ratio increased by 76% to 100%, from 88% to 103%, from 95% to 106%, and 95% to 104% respectively. Other countries saw their enrollment ratio rise less than the average. For example, in the United Arab Emirates, the ratio rose from 103% in 1996 to 108% in 2018. The enrollment ratio of Iran increased from 105% to 110% during the same period. Meanwhile, other countries – Bahrain, Jordan, Kuwait, and Turkey – saw their enrollment ratio decrease during the period 1996-2018.

Figure 2: Gross enrollment ratios for education levels by country, 1996 and 2018



Source: World Bank (2020).

With regard to secondary education, the gross enrollment ratio in the Middle East states raised by 22.33% from 1996 to 2018. The performance of each country was different. The four countries that recorded the lowest ratio of enrollment in secondary education in 1996 were Turkey with 56% of the gross enrollment ratio, Saudi Arabia with 61%, Oman with 68%, and Egypt with 69%. In 2018, the enrollment ratio for secondary education was highest in Saudi Arabia with 110%, followed by UAE and Turkey with 109% and 107%, respectively. For tertiary education, the gross enrollment ratio in the Middle East countries rose by 176% between 1996 and 2018. When analyzing the enrollment ratio for tertiary education, Kuwait and Qatar were the only countries whose enrollment ratio reached 24% in 1996. By 2018, the situation had greatly improved. However, the improvement is still considered to be insufficient, especially in some countries like Qatar, Jordan, and Egypt. The countries with the largest enrollment ratio were Turkey, Saudi Arabia, and Iran with, respectively, 95%, 68%, and 67% (Figure 2).

3 Literature Review

Prior literature dedicated to the influence of education levels on economic growth showed mixed outcomes. To begin with cross-sectional studies, Murphy et al. (1991) showed that primary education positively influenced growth in 91 countries from 1970 to 1985. In a study done by Barro (1996) in around 100 countries during 1960 to 1990, it was shown that primary education was an important factor to promote the growth rate. Panel data have become common due to the complete and available data. Agiomirgianakis et al. (2002) used panel data, which included 93 nations from 1960 to 1987. Based on their findings, education levels expansion resulted in higher growth of the economy, indicating that governments need to boost higher education expansion for greater development in their economies.

For secondary education, Benos and Karagiannis (2010) revealed the significant influence of secondary education on growth in 51 Greek regions for 1981 to 2003. A similar result showing a robust correlation between economic growth and human capital that was proxy by the secondary enrollment ratio was also found in 79 nations between 1960 and 2001 (Suri et al. 2011). For tertiary education, Gyimah-Brempong et al. (2006) showed that the tertiary education significantly

affected the per capita income growth in 34 African countries for the period 1960 to 2000.

In relation to the above studies, Awad et al. (2013) showed that secondary and tertiary education levels significantly affected the economic growth of Arab countries for the years spanning from 1990 to 2010. Also, in other studies like Lutz et al. (2008) and Lee and Kim (2009), the authors supported the role of secondary and tertiary education as top determinants of economic growth. Similarly, Tsai et al. (2010) showed that secondary and tertiary education in 60 (developed and developing) nations for the years 1996 and 2006 contributed to the growth of the economies. Along the same line of study, attaining education positively related with the European countries' economic growth (Sterlacchini 2008). Human capital (proxied by school enrollment ratio) was found to be significantly related to the Arab countries' economic growth for the years 1974 to 2013 (Edrees 2016).

Time series data are the least usual kind of analysis. However, Shaihani et al. (2011) revealed a positive relationship between secondary education and the short-term growth of the economy, while a positive relationship between tertiary education and the long-term growth of the economy. Pegkas (2014) supported the positive role of secondary and tertiary education on the growth of the economies. In the context of this study focused on Greece, primary education also had not significant contribution to the country's economy. On the other hand, all levels of education were found to positively influence the economic growth of Pakistan in the research done by Jalil and Idrees (2013). For MENA countries, Heyneman (1997) reported that the MENA countries should increase the level of educational quality by encouraging participation in higher education to achieve a prosperous economy. Akkari (2004) suggested that the MENA countries must increase their investment in education as well as in economic sectors where the skills acquired through knowledge can promote more economic growth.

Deniz and Dogruel (2008) concluded that the invested efforts and costs in all education levels could bring about the MENA countries' economic development. According to the outcome of the estimation tests, education quality in both primary and secondary education had long-term influence on the Turkish economic growth. Meanwhile, primary and secondary level of education enrollment positively affected the middle-income

nations' economies, whereas higher education positively affected the higher-income nations' economies (Amaghous and Ibourk 2013). Also, in the long-run, Latif et al. (2011) showed that primary, secondary and tertiary education had a significant relationship with economic growth in the Malaysian context. The positive significant sign of tertiary enrollment and secondary enrollment in the long run demonstrate that these variables are very important for Malaysia's economic development. Lawanson (2017) revealed that the effects of primary enrollment rate and tertiary enrollment rate on economic development were positively significant. Secondary enrollment rate showed negative and insignificant effect on economic development in Nigeria. The authors suggested the suitable capital expenditure appropriation towards education for the promotion of the country's economic growth.

Added to the above studies, a consistent long-run relationship was found in Ethiopia between real GDP per capita and secondary school enrollment (Gebrehiwot 2016). Bayraktar-Sağlam (2016) contended that in the higher education levels, advanced knowledge and skills are developed, which thereafter functions as significant determinants of the growth of the country's economy. This indicates that economic growth is promoted by tertiary education through the facilitation of innovation new technologies diffusion and adoption.

For sub-Saharan African (SSA) countries, Ogundari and Awokuse (2018) revealed that a 10% increase in the enrollment to primary, secondary, and tertiary schools, would lead to percentage increases in per capita GDP growth 0.82%, 0.46% and 0.01%, respectively. Kyophilavong et al. (2018) found that educational promotion at the entire levels leads to increased growth, while growth in turn, reinforces the development of education.

Limited previous studies concentrated on the effects of gender in education levels on the growth of the country's economy. One such study, however, is Barro (2001) who showed that the school attainment years at secondary and tertiary significantly affected economic growth in the case of males, while, for females, school attainment years insignificantly affected economic growth for around 100 countries from 1965 to 1995. According to Kalaitzidakis et al. (2001), growth was influenced by the completion of education by males and females in 93 economies between 1960 and 1990. In addition, Knowles et al. (2002) produced a model of neoclassical growth that involved male and female education as variables.

The results reported the strong effect of female education on labor productivity in 73 countries for 1960 to 1990.

In India, Self and Grabowski (2004) reported that all female education levels are potential contributors to the economic growth, while the male's contribution to economic growth only appeared at the primary level. Shalini et al. (2012) revealed that females with high school as their highest education level, significantly contributed towards the economic growth, contributing approximately 3.35%. However, the results also point out that the male secondary school graduates contributed to the countries' development more significantly as compared to the female, whereby the formers' contribution towards the economic development is approximately 5%.

The research conducted by Tansel and Güngör (2012) showed that female education significantly influenced labor productivity in Turkey, whereas the male education insignificantly affected labor productivity. For the Asia Pacific region, Oztunc et al. (2015) highlighted the significance of female primary education on income per capita growth. The same was highlighted by Khan (2016) in the Pakistani context in that a positive relationship was supported between female human capital and long-term economic growth.

Moreover, Orisadare et al. (2018) reported that male secondary education and female tertiary education positively influenced Nigeria's economic growth in both the short and the long run. However, female secondary education and male tertiary education negatively influenced economic growth in the short and long run. Similarly, the empirical analysis done by Singh et al. (2018) found that, in Malaysia, male education seemed to be more significant for long run growth than female education. Meanwhile, female education seemed to be more significant to growth than the male education in the short run. The recent study by Raifu (2019) evidenced that both genders' educational achievements positively affect the growth of the economy, with male achievements having more weight. This indicates that African governments should focus on developing their citizens (male and female) by providing them with quality education. Also, they must focus on educating their female citizens as they are evidenced to be falling behind the male citizens when it comes to educational achievements.

Literature examined supported the key role of education in increasing the growth of the economies. Also, in literature dedicated to the Middle East countries, the relationship between education and economic growth, has not been extensively examined and empirical findings differ from one nation to the next, owing to the analysis methods variations and the level of economic development. More importantly, literature on disaggregated studies is still lacking. Therefore, the present study minimizes the literature gap by focusing on the influence of primary, secondary and tertiary levels, through gender disaggregation, on the Middle East countries' economic growth.

4 Methodology

4.1 Theoretical economic modelling

To investigate the impact of education levels on the growth of the Middle East countries economies the model of growth of Mankiw et al. (1992) is adopted. Where an important factor of production is accommodated human capital. Based on the model, economic growth is determined by value of knowledge and labor is determined by the accumulation of skills, with the consideration that households' savings investments are in human capital:

$$Y = K^\alpha H^\beta L^{1-\alpha-\beta} \quad (1)$$

Where, Y = output, K = physical capital, H = human capital, and L = labor force. If both sides of equation (1) are converted to logarithm:

$$\log Y_t = \alpha \log K_t + \beta \log H_t + (1 - \alpha - \beta) \log L_t \quad (2)$$

Equation (2) above can be modified to accommodate other additional variables:

$$\log Y_{it} = \alpha_1 + \beta \log Edu_{it} + \gamma \log Z_{it} + e_{it} \quad (3)$$

Where Y_{it} is the real GDP per capital, Edu_{it} are variables of education and Z_{it} indicate the economic variables.

4.2 Model Specifications

The first step involved the study making use of annual panel data spanning from 1996 to 2018 to investigate the influence of the three education levels on the Middle East countries' economic growth. Secondly, the education levels were disaggregated by gender (male and female) to look into their influence on the growth of the economy and thus, the estimated model is represented in the following:

$$\ln Y_{it} = \alpha_1 + \alpha_2 TPE_{it} + \alpha_3 TSE_{it} + \alpha_4 TTE_{it} + \alpha_5 EXP_{it} + \alpha_6 PG_{it} + \alpha_7 LFG_{it} + \alpha_8 CS_{it} + \alpha_9 TR_{it} + w_{it} \quad (4)$$

Where Y_{it} is the log of real GDP per capita, TPE_{it} is primary enrollment for both sexes, TSE_{it} denotes secondary enrollment for both sexes, TTE_{it} shows tertiary enrollment for both sexes, and EXP_{it} is government expenditure on education. Moreover, PG_{it} represents population growth, LFG_{it} shows labor force growth, CS_{it} is growth rate of capital stock, TR_{it} represents share of trade on GDP, RQ_{it} is regulatory quality, and w_{it} represents the error term. Following the empirical literature on economic growth that offers a variety of independent variables that must be included in the analysis in order to avoid misspecification, population growth, labor force growth, physical capital stock and share of trade on GDP were included in the model. In addition, the economic variables were included in the model to avoiding the omitted variable bias. In order to be reliable, indeed, the model must be proven as robust under a series of different specifications.

In the following models, the school enrollment variables are disaggregated based on gender. The first model contains the male enrollment variables and the other contains the female enrollment variables.

$$\ln Y_{it} = \alpha_1 + \alpha_2 MPE_{it} + \alpha_3 MSE_{it} + \alpha_4 MTE_{it} + \alpha_5 EXP_{it} + \alpha_6 PG_{it} + \alpha_7 LFG_{it} + \alpha_8 CS_{it} + \alpha_9 TR_{it} + w_{it} \quad (5)$$

In model (5), the enrollment variables for both sexes are replaced by male enrollment variables, including MPE_{it} , which shows male primary enrollment, MSE_{it} that denotes male secondary enrollment, and MTE_{it} , which represents male tertiary enrollment.

$$\ln Y_{it} = \alpha_1 + \alpha_2 FPE_{it} + \alpha_3 FSE_{it} + \alpha_4 FTE_{it} + \alpha_5 EXP_{it} + \alpha_6 PG_{it} + \alpha_7 LFG_{it} + \alpha_8 CS_{it} + \alpha_9 TR_{it} + w_{it} \quad (6)$$

In model (6), the male enrollment variables are replaced by FPE_{it} , which is female primary enrollment, FSE_{it} , which denotes female secondary enrollment, and FTE_{it} , which signifies female tertiary enrollment. In addition, the EXP_{it} , PG_{it} , LFG_{it} , CS_{it} , and TR_{it} variables are included in all the models.

4.3 Model estimation

This study employed static panel data models. Using panel data has numerous advantages, with a few of them being, being able to control individual heterogeneity, mitigate data multicollinearity issues, and acquiring accurate estimates of micro relationships. First, unit root tests have to be conducted for the series data to investigate their stationarity. The second step entails the analysis of the influence of education levels on the economic growth with using panel data regression and with this, there are three alternative methods - pooled ordinary least square (OLS), fixed effect and random effects. But if heterogeneity bias is formed through pooled OLS forms as a result of which, it is unable to reach inaccurate conclusions, random and fixed effects models are used to explain the units' individual features. Following the estimation of the pooled OLS and random effects models, the Breusch-Pagan LM test is used to confirm if inferences can be drawn based on the pooled OLS model or random effects model. If the random effects model is found to be suitable over the former, then the fixed effects model is estimated against the random one through the Hausman test to determine the most suitable.

Following the establishment of a convenient model, the diagnostic tests are used for analysis, with the following sequence of steps. First, the Variance Inflation Factor (VIF) is used to examine the presence of multicollinearity. With mean VIF mean value less than 10, confirms the absence of multicollinearity. Second, the detection of heteroskedasticity will be performed if the fixed effects model is chosen as appropriate. Heteroskedasticity becomes an issue if the probability value for the Modified Wald test is lower than 0.05. Thirdly, the Wooldridge test for autocorrelation in the panel data is run to inspect for serial correlation. When the probability value is lower than 0.05, it indicates that the problem of correlation exists, and the parameters are inefficient.

4.4 Variable construction and data

This study comprises the annual panel data for ten Middle East countries, namely Saudi Arabia, Qatar, Kuwait, Oman, Bahrain, Turkey, Iran, Egypt, Jordan, and the United Arab Emirates, covering the period 1996 to 2018. Owing to data limitation in the examined study period for the Middle East countries, the present study limits the data by focusing on ten selected countries. The data are taken from the World Development Indicators and Worldwide Governance Indicators.

Table1 presents the result of the descriptive statistics of variables. Once the data was tabulated in the STATA Software, can start looking at summary statistics. The "sum" command in STATA is used to obtain the descriptive statistics of variables. Where: observations is the number of valid observations for the variable, mean is the sum of a variable's values divided by the total number of values and it is the most widely used measure of central tendency, standard deviation (St. Dev.) is the square root of the variance and it measures the spread of a set of observations, minimum (Min.) is the smallest value of the variable, and maximum (Max.) is the largest value of the variable.

Table 1: Descriptive statistics of variables

Variables	Observations	Mean	St. Dev.	Min.	Max.
Real GDP per capita	206	10.23	0.94	8.48	11.77
Primary enrolment	210	100.13	8.67	67	118.4
Secondary enrolment	210	88.14	10.75	56	110.46
Tertiary enrolment	210	29.55	15.15	6.02	94.73
Expenditure on education	210	4.11	1.42	1	8.33
Population growth	210	3.69	3.04	0.09	16.33
Labor force growth	210	0.05	0.04	- 0.04	0.23
Growth rate of capital stock	210	10.57	8.19	-16.64	40.71
Trade openness	205	88.46	37.54	29.23	191.88

5 Empirical Results

5.1 Unit root test

The estimation starts by testing unit roots of the panel. The primary reason behind carrying out the unit root tests is to investigate the series stationary

or otherwise. STATA provides a few panel data unit root tests. Levin, Lin and Chu's (LLC) test being the tests that have been extensively utilized, where the null is the unit root, the alternative to it being the common stationary root. An alternative step involves using Fisher (1932) results to run tests combining p-values from individual unit root tests. Such a test was introduced by Maddala and Wu (1999) and Choi (2001), where the null hypothesis is that panels have a unit root and as such, the alternative is that, the panels have no unit root. The test may be described as asymptotically Chi-square distribution, having $2N$ degrees of freedom. The test top advantage is its handling of unbalanced panels. Moreover, the lag lengths differ in terms of individual ADF tests. The results of the panel unit root tests, Levin, Lin Chu test and ADF-Fisher Chi-square are tabulated in Table 2. Based on the results, the tests were statistically significant at the level of 5%, indicating that unit root is absent and there is stationary data, allowing the running of regressions to analyze the empirical results.

Table 2: Panel nit root test for variables

Variables	Levin, Lin & Chu	ADF - Fisher Chi-square	Final result
Real GDP per capita	-13.696 (0.000)	29.629 (0.041)	I (0)
Primary enrolment	-1.689 (0.046)	33.927 (0.027)	I (0)
Secondary enrolment	-6.339 (0.000)	74.420 (0.000)	I (0)
Tertiary enrolment	-1.885 (0.030)	58.713 (0.000)	I (0)
Education expenditures	-3.059 (0.001)	58.709 (0.000)	I (0)
Population growth	-2.500 (0.006)	46.536 (0.001)	I (0)
labor force growth	-3.147 (0.001)	34.661 (0.022)	I (0)
Growth rate of capital stock	-2.509 (0.006)	55.324 (0.000)	I (0)
Trade openness	-5.515 (0.000)	33.321 (0.015)	I (0)

Notes: Values in parentheses refer to the probability of the test statistics. The null hypothesis of Levin, Lin & Chu t-test assumes common unit root process, while the ADF - Fisher Chi-square assumes individual unit root process.

5.2 Static panel data models

The panel data techniques namely pooled OLS, random effects and fixed effects models were conducted to check for the outcome's accuracy and robustness. Table 3, Table 4, and Table 5 present the estimation results for the three models that are expressed in equations 4, 5, and 6.

The three alternative model's estimation outcomes regarding the influence of education levels on economic growth are presented in Table 3. Based on the results produced by the Breusch-Pagan LM test, F-test and Hausman test, the following conclusions were reached; specifically, the Breusch-pagan LM test selected the random effects over the pooled OLS as the probability value for LM test is lower than 0.01, whereas the F-test selected the fixed effect model for the same reason. Thus, the next step involves the selection between the random and fixed effects models using Hausman test, of which the results were inclined towards the fixed effects model's superior specifications over the random effects specification (P-value in Hausman test is lower than 0.01).

Moreover, the analysis will proceed with the diagnostic tests. The mean VIF is lower than 10, which indicates the absence of multicollinearity issue. The results show that null hypotheses are rejected (probability values are lower than 0.01), for the tests of heteroskedasticity and autocorrelation. This indicates that there are heteroskedasticity and autocorrelation problems. Therefore, the fixed effects model with robust standard errors is used to rectify the heteroskedasticity and autocorrelation problems.

The robust fixed effects findings in Table 3 showed primary education has no effect on economic growth. The most important reason might be that the returns to primary education are very low especially in case of the agriculture sector.

Secondary and tertiary education positively influence economic growth. This shows the importance of investing in the education of both sexes and development of their skills as both have potential to contribute to the economy substantially. Although education levels are indispensable to Middle East economies, it is apparent that tertiary education attainment has highest effects on economic growth. This finding corroborates the saying that the importance of tertiary education is obviously undeniable

in terms of generating highly skilled workers who drive toward growth and achieving a high-income economy.

Table 3: The Impact of education levels on economic growth

Variables	Pooled OLS	Random Effect	Fixed Effect	Robust Fixed Effect Model
Primary enrolment, both sexes	-0.042 (-6.28) ***	-0.008 (-2.46) **	-0.003 (-1.58)	-0.003 (-0.81)
Secondary enrolment, both sexes	0.066 (10.14) ***	0.012 (3.58) ***	0.005 (2.24) **	0.005 (1.90) *
Tertiary enrolment, both sexes	-0.018 (-5.42) ***	0.008 (4.62) ***	0.011 (10.48) ***	0.011 (4.45) ***
Education expenditures	-0.178 (-5.07) ***	-0.081 (-3.62) ***	-0.062 (-4.08) ***	-0.062 (-1.62)
Population growth	0.057 (2.79) ***	0.025 (2.92) ***	0.014 (2.42) **	0.014 (2.00) *
Growth rate of labor force	2.840 (1.90) *	-0.725 (-1.17)	-0.763 (-1.89) *	-0.763 (-2.48) **
Growth rate of capital stock	-0.009 (-1.71) *	-0.001 (-0.22)	-0.001 (-0.03)	-0.001 (-0.01)
Trade openness	-0.003 (-2.16) **	0.002 (1.77) *	-0.001 (-0.07)	-0.001 (-0.04)
Constant	9.884 (17.24) ***	9.883 (36.55) ***	10.022 (59.26) ***	10.022 (51.63) ***
Breusch-Pagan LM test	461.78 (0.000) ***			
F-test (fixed effects)	345.70 (0.000) ***			
Hausman test	115.77 (0.000) ***			
R-squared	0.597	0.535	0.596	0.596
Observations	201	201	201	201
Multicollinearity (Mean VIF)	1.82			
Heteroscedasticity (χ^2 - stat)			476.79 (0.000) ***	
Serial Correlation (F-stat)			161.745 (0.000) ***	

Notes: Values in the brackets are t-statistics, except for Breusch-Pagan LM test, F-test, Hausman test, Hetero, and Serial Correlation, which are probability value. The symbols *, ** and *** indicate statistical significance at the 10, 5 and 1 % levels, respectively.

The growth rate of the population positively and significantly influences economic growth, establishing the optimist's approach, which states that the rate of population growth positively affects the growth of the economy. The positive sign in the case of the Middle East can be explained by the rising ratios of primary and secondary school enrollment in the region, thus leading to a greater proportion of educated workforce when entering

the working age. As for the labor force growth rate negatively influence the economic growth, which could be related to the unskilled workforce in the region Pissarides and Végonzonès-Varoudakis (2006), and the low productive jobs of stemming from the unskilled workers that do not contribute to the economic growth. According to Amir et al. (2015), an increase in illiterate labor force has negative impact on economic growth. The result postulated that unqualified and unskilled labor forces retard economic growth in Pakistan. Another possibility is that this result could be as a result of high rate of unemployment in the Middle East countries. In the study by Orisadare et al. (2018) showed that the rate of labor force participation significantly and negatively affected Nigeria's economic growth, which may be attributed to the high rate of unemployment and under-employment rate in the country. Government education expenditure, growth rate of capital stock, and trade openness have no effect on economic growth since the coefficients are insignificant.

Table 4 presents the estimation results of the three alternative models for the influence of male's education levels on economic growth. The Breusch-Pagan LM test, F-test, and Hausman test statistics are display in the same table. The Breusch-pagan LM test selected the random effects over the pooled OLS as the probability value for the LM test is lower than 0.01, whereas the F-test selected the fixed effect model for the same reason. Thus, the next step involves the selection between the random and fixed effects models using Hausman test, of which the results were inclined towards the fixed effects model's superior specifications over the random effects specification (p-value in Hausman test remained lower than 0.01). Then, the analysis will proceed with the diagnostic tests. The mean VIF is lower than 10, which indicates the absence of multicollinearity issue. The results show that null hypotheses are rejected (probability values are lower than 0.01), for the tests of heteroskedasticity and autocorrelation. This indicates that there are heteroskedasticity and autocorrelation problems. Therefore, the fixed effects model with robust standard errors is used to rectify the heteroskedasticity and autocorrelation problems.

Table 4: The impact of male's education levels on economic growth

Variables	Pooled OLS	Random Effect	Fixed Effect	Robust Fixed Effect Model
Primary enrolment, male	-0.030 (-4.58) ***	-0.002 (-0.58)	-0.001 (-0.12)	-0.001 (-0.12)
Secondary enrolment, male	0.044 (8.87) ***	0.001 (0.16)	-0.001 (-0.61)	-0.001 (-0.69)
Tertiary enrolment, male	-0.018 (-5.74) ***	0.013 (10.34) ***	0.014 (13.49) ***	0.014 (5.44) ***
Education expenditures	-0.116 (-3.34) ***	-0.057 (-3.17) ***	-0.052 (-3.41) ***	-0.052 (-1.43)
Population growth	0.066 (3.11) ***	0.023 (3.34) ***	0.019 (3.34) ***	0.019 (3.08) **
Growth rate of labor force	3.099 (2.01) **	-0.685 (-1.40)	-0.703 (-1.71) *	-0.703 (-1.89) *
Growth rate of capital stock	-0.003 (-0.53)	-0.001 (-0.16)	-0.001 (-0.20)	-0.001 (-0.09)
Trade openness	-0.001 (-0.50)	0.002 (1.59)	0.001 (0.69)	0.001 (0.33)
Constant	9.949 (16.92) ***	10.100 (42.64) ***	10.096 (59.51) ***	10.096 (49.36) ***
Breusch-Pagan LM test	352.28 (0.000) ***			
F-test (fixed effects)			355.92 (0.000) ***	
Hausman test		63.78 (0.000) ***		
R-squared	0.573	0.575	0.583	0.583
Observations	201	201	201	201
Multicollinearity (Mean VIF)	1.69			
Heteroscedasticity (χ^2 – stat)			305.57 (0.000) ***	
Serial Correlation (F-stat)			113.186 (0.000) ***	

Notes: Values in the brackets are t-statistics, except for Breusch-Pagan LM test, F-test, Hausman test, Hetero, and Serial Correlation, which are probability value. The symbols *, ** and *** indicate statistical significance at the 10, 5 and 1 % levels, respectively.

Table 4 tabulates the robust fixed effects model's results and from the table, it is evident that male primary education and male secondary education had insignificant influence on the economic growth, but the male tertiary education had a positive influence on the economic growth – indicating that increasing male tertiary education could boost economic growth. Also, the population growth rate coefficient had a positive influence on the growth of the economy, while that of labor force had a negative influence on such growth. Moreover, government expenditure on education, growth rate of capital stock, and trade openness have no effect on economic growth since the coefficients are insignificant.

The three alternative model's estimation outcomes concerning the influence of female's education levels on economic growth are presented in Table 5. Based on the results produced by the Breusch-Pagan LM test, F-test and Hausman test, the following conclusions were reached; specifically, the Breusch-pagan LM test selected the random effects over the pooled OLS as the probability value for the LM test is lower than 0.01, whereas the F-test selected the fixed effect model for the same reason. Thus, the next step involves the selection between the random and fixed effects models using Hausman test, of which the results were inclined towards the fixed effects model's superior specifications over the random effects specification (p-value in Hausman test remained lower than 0.01). Then, the analysis will proceed with the diagnostic tests. The mean VIF is lower than 10, which indicates the absence of multicollinearity issue. The results show that null hypotheses are rejected (probability values are lower than 0.01), for the tests of heteroskedasticity and autocorrelation. This indicates that there are heteroskedasticity and autocorrelation problems. Therefore, the fixed effects model with robust standard errors is used to rectify the heteroskedasticity and autocorrelation problems.

Table 5: The impact of female's education levels on economic growth

Variables		Pooled OLS	Random Effect	Fixed Effect	Robust Fixed Effect Model
Primary female enrolment,		-0.044 (-6.92) ***	-0.005 (-2.77) ***	-0.004 (-2.45) **	-0.004 (-1.06)
Secondary female enrolment,		0.065 (10.94) ***	0.011 (4.91) ***	0.009 (4.58) ***	0.009 (2.54) **
Tertiary female enrolment,		-0.005 (-1.38)	0.010 (8.98) ***	0.010 (10.35) ***	0.010 (4.30) ***
Education expenditures		-0.178 (-5.36) ***	-0.090 (-5.67) ***	-0.084 (-5.76) ***	-0.084 (-2.67) **
Population growth		0.047 (2.34) **	0.019 (3.29) ***	0.017 (3.25) ***	0.017 (2.30) **
Growth rate of labor force		3.656 (2.54) **	-0.832 (-2.09) **	-0.843 (-2.32) **	-0.843 (-3.36) ***
Growth rate of capital stock		-0.011 (-2.08) **	-0.001 (-0.38)	-0.001 (-0.26)	-0.001 (-0.14)
Trade openness		-0.003 (-2.47) **	-0.001 (-0.62)	-0.001 (-1.30)	-0.001 (-0.73)
Constant		9.964 (19.62) ***	9.940 (48.54) ***	9.935 (68.83) ***	9.935 (36.58) ***
Breusch-Pagan LM test		681.20 (0.000) ***			
F-test (fixed effects)				396.25 (0.000) ***	
Hausman test			39.64 (0.000) ***		
R-squared		0.622	0.665	0.667	0.667
Observations		201	201	201	201
Multicollinearity (Mean VIF)		1.96			
Heteroscedasticity (χ^2 - stat)				230.80 (0.000) ***	
Serial Correlation (F-stat)				111.461 (0.000) ***	

Notes: Values in the brackets are t-statistics, except for Breusch-Pagan LM test, F-test, Hausman test, Hetero, and Serial Correlation, which are probability value. The symbols *, ** and *** indicate statistical significance at the 10, 5 and 1 % levels, respectively.

In Table 5, the robust fixed effects model outcome is presented and from the table, it is evident that female primary education has no significant effect on economic growth, confirming the argument that primary educated individuals' skills are insufficient to acquire high productive positions. This outcome was supported by Hanif and Arshed (2016), who revealed a negative primary education-economic growth relationship in the context of SAARC countries. Both secondary and tertiary education of female positively and significantly influence economic growth, which shows that increasing such levels of education could boost the growth of the economy. The results are similar to previous studies showed that a positive relationship between female education and economic growth (El Alaoui 2016, Oztunc et al. 2015, Kaur and Letic 2012). El Alaoui (2016) found that female education has positive effect on economic growth of countries such as Morocco, Algeria, Tunisia and Egypt.

The results show the negative effect of government education expenditure on economic growth. This might be due to the allocated funds for education sector development not being properly utilized (Nurudeen and Usman 2010). In the study by Heyneman (1997), it was shown that the main reason behind the low-quality education in the Middle East and North Africa is not a scarcity of monetary resources but the inefficiency of managing the resources already allocated. The coefficient of labor force growth is negative and significant, whereas the coefficient of population growth is positive and significant. Growth rate of capital stock and trade openness have no effect on economic growth.

5.3 Discussion of findings

5.3.1 Main points of findings

In this section, the findings of the effects of education by levels and gender on economic growth were discussed under four main points. The first discussion point relates to the results indicating that the secondary and tertiary education are significant and contribute positively to economic growth. This confirms that the people who have completed secondary and tertiary education able to make their potential contribution to the economy, where secondary and tertiary education provides the labor market with people who have medium and higher skills to enhance their productivity and enable them to contribute to achieving a high-income economy. The results are similar to that obtained by Awad et al. (2013) who showed that both secondary and tertiary education

significantly affected economic growth in Arab countries from 1990 to 2010. Based on the research done by Lutz et al. (2008), together with Lee and Kim (2009), secondary and tertiary education were the main determinants of economic growth. Further, Tsai et al. (2010) who reported that the most important contributors to economic growth were secondary and tertiary education in 60 developed and developing countries between 1996 and 2006. These results are consistent with the recent studies such as Jamel et al. (2020) who confirmed the positive and significant impact of the education on economic growth in a sample of middle-income countries through panel data regressions. In Nigeria, Omodero and Nwangwa (2020) showed that education and economic growth have a long term cointegration. In addition, Laoufi et al. (2020) revealed that a strong positive relationship between education and economic growth and that economic growth occurs from during the development of human resources.

The second discussion point relates to the results indicating that the primary education has no effect on economic growth in the three specifications (both sexes, male and female). The most important reason might be that the skills of primary educated people are not enough to obtain high productive jobs. Production of primary educated workers tends to be concentrated in low value-added sectors that do not require high skills or education levels. Most of the primary educated workers are working in the agriculture sector. The returns to primary education are very low especially in case of the agriculture sector. This result is in line with studies such as Abbas (2001), Shaihani et al. (2011), Pegkas (2014), and Hanif and Arshed (2016) who found a negative impact of primary education on economic growth. As Romer (2001) noted, primary education might not show short run results in the economy, but has indirectly long-term effects on it. As primary is the first and basic level of education it is very important for the other two levels of education.

The third discussion point relates to the results indicating that the tertiary education contributed more to the economic growth compared to primary and secondary and education in the three specifications (both sexes, male and female). According to Masri and Wilkens (2011), tertiary education has an invaluable part in the community as it develops further prospects for progress and offers knowledge transfer for students and other interested parties, and encourages transformation, creativeness, innovativeness, and advancement. It is probably because in the past two

decades there has been a proliferation of tertiary education institutions in the Middle East that has led to many of the graduates of tertiary education. The graduates of universities find jobs in the fields in which they were trained due to market-oriented and cutting-edge programs. It is clear that higher education graduates possess the requisite knowledge and skills that are a good match for the needs of the labor market and the employers seem to find so valuable to employ them. According to Agasisti and Bertolotti (2020), an increase in number of universities is conducive to strong economic growth in the European regions. In Chongqing, Sun (2020) revealed that there is a long-term stable equilibrium relationship between higher education and economic growth.

The fourth discussion point relates to the results indicating that the female education levels are highly positively related to the economic growth compared to the male education levels. This result is consistent with the findings of Self and Grabowski (2008), Khan (2016), Sehwat and Giri (2017), and Singh et al. (2018) who indicated that female education accounted more to the economic growth in comparison to males. In addition, in the study by Karimi et al. (2020) analyzed the role of women's education in economic development in 13 selected Islamic countries between 2000 and 2014. They found that women's education has had a positive and significant effect on GDP growth in these countries. The findings can be explained by the fact that females have multidimensional part to play in the community in comparison to their male counterparts. Thus, whatever policies that enhances and empower females, the outcomes are disseminated to the entire community, inclusive of the economic sector. The outcome is in tandem with the policies by the government towards the enhancement of the involvement of women in the economy by the intensification of the participation of females in the workforce.

Educating women is considered to be a crucial factor in intensifying the participation of females in the labor force, because intensifying female schooling will result in enhancing the skills and knowledge of educated women, enabling them to participate in the workforce, obtain professional occupations and secure higher incomes. Furthermore, enhanced female education can alter outdated conventional mindsets toward the part played by women in the workforce.

5.3.2 Countries income classification and education

According to the World Bank, the ten sampled countries were classified into low-middle income, upper-middle income and high income to understand if each country's income level could be responsible for the education development (see Table 6).

Table 6: Income countries' classification (GNI per capita)

Classification	Country
Lower Middle Income	Egypt
Upper middle Income	Iran, Jordan, Turkey
High Income	Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates

Source: World Bank (2020).

In the high-income group, free education is provided by the governments for all levels of education. Generally, the gross enrolment ratio for all levels of education as well as education expenditure have increased in the GCC countries over the years. For the GCC countries, Bahrain promotes the setting up and running of institutions of higher learning, deriving the pool of intake from expatriate talents, and from the cumulative pool of incoming homeward bound Bahrainis from abroad, possessing advanced degrees. Kuwait possesses the highest rate of literacy in the Arab world. Primary and intermediate level education is obligatory for all students within the age range of 6 years old up to 14 years old. In Oman, there were only three formal schools that were available for the whole of Oman, with less than 1,000 pupils prior to the year 1970. Currently, high importance was placed for education by the government to enhance the domestic workforce, that the government deems a crucial factor in the development and growth of the economy and social aspects of the country. Qatar emplace a heavy budget educational expenditure; it has one of the exorbitantly high per-pupil expenditures globally. In Saudi Arabia, there was a rapid expansion in the higher education sector, with the establishment of great numbers of Universities and colleges, predominantly since 2000. The improvement of education and research are the core concerns for the UAE.

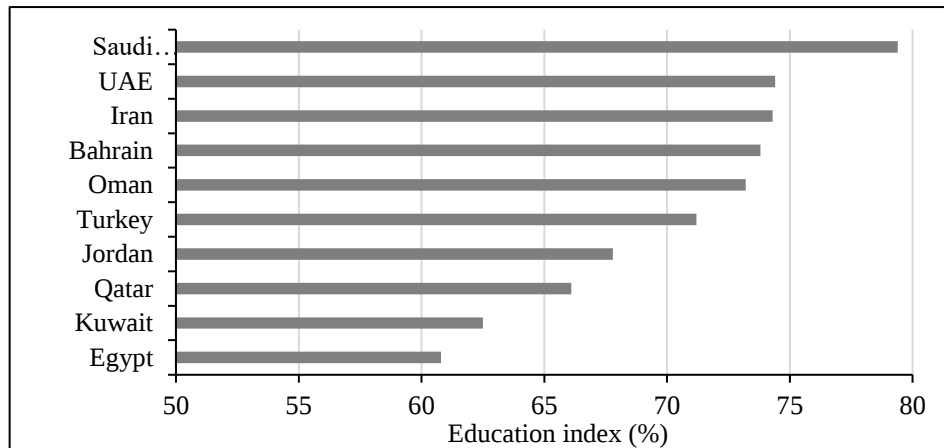
The second group is the upper middle-income group comprises Iran, Jordan and Turkey. On matters pertaining education in Iran, in 2018, the enrolment in primary schools was 110.71% due to the fact that primary

education is obligatory. However, secondary school attendance is not obligatory. Consequently, due to the non-obligatory attendance for education beyond primary school, the enrolment rates are lesser—with approximately 86.31% enrolment for secondary schools and 68.12% for tertiary educational institutions in 2018. In Jordan, the rate of enrolment in education levels have increased in recent years. The percentage of knowledgeable and skilled workers in Jordan is acknowledge to be amongst the greatest in number regionally, in the ICT and industrial sectors, resultant from a comparatively contemporary educational system. In the case of Turkey, the adult literacy rate is 96.15%. The rate of literacy for male is 98.82%, and the rate of literacy for females is 93.5% in 2018 (World Bank 2020).

The third group is the lower middle-income group comprises Egypt. Pertaining the education sector in Egypt, there was a decline in the illiteracy rate in year 1996 from 39.4% has declined to 25.8% in 2017. According to World Bank (2020), the literacy rate for Egyptian adults in the year 2017 was calculated to be 71.2 %.

Education is a key factor towards the attainment of well-being and is utilized in the gauging of the economic development, and in the quality of life, that entails the core aspect in ascertaining the degree of development that a country has reached, such as it being a developed, developing, or an underdeveloped country. A recent study by Atiq-ur-Rehman et al. (2020) revealed that the education supports the human capital formation and stimulate economic growth in emerging Asian economies. Dao and Trinh (2020) found that their final findings are supportive to the hypothesis made: education is critical factor of economic enhancement.

According to (UNDP (2018)), the education index was gauged through the combination of average adult years of schooling with the required years of schooling for children, for which each receive 50% weighting. Figure 3 shows the education index in the Middle East countries. Education index in 2018 was highest in Saudi Arabia with 79.4%, followed by UAE and Iran with 74.4% and 74.3%, respectively. The four countries that recorded the lowest education index in 2018 were Egypt with 60.8% of the education index, Kuwait with 62.5%, Qatar with 66.1%, and Jordan with 67.8%.

Figure 3: Education index, 2018

Source: UNDP (2018).

Overall, it is crucial for the Middle Eastern countries to concentrate on the capacity building of their male and female citizens via the offering of quality education. It is imperative for intensified focus to be given in educating of female citizens who are left behind in comparison to their male counterparts. It is of the utmost importance that the availability of education must not only be according to theoretical learning only, but education must also include hands-on experiential learning that would ensure the establishment of relevant skills pertinent to fulfill and match the needs of all sectors of the economy after they finished their schooling. A holistic education approach should be provided, which would enhance their capacity building, knowledge and skills development, in addition to nurturing a regional long-term economic growth.

6 Conclusion

This study seeks to empirically examine the effect of three education levels (primary, secondary and tertiary) on the economic growth of the Middle East countries. An economic growth model was adopted for the disaggregated education levels by gender to investigate their influence on economic growth. Analysis of data was conducted through the use of static panel data models on ten Middle East countries, for the years 1996 to 2018.

The results found both secondary and tertiary education had significant and positive effects on the economic growth. With regards to gender, female secondary education and female tertiary education, and male tertiary education were found to have positive effects on the Middle East countries' economic growth.

Based on the results, primary education should be made compulsory for all in the Middle East countries as the impact is found to be insignificant to growth. This policy will increase the enrollment rate for secondary education that positively influences the Middle East countries' economic growth. In addition, this policy will lead to achieving faster economic growth, in line with previous studies that report that an increase in education promotes economic growth. Besides, governments should formulate policies that will help reduce the gap between the graduate job skills and the skills needed in the workplace, especially for tertiary graduates. The importance of tertiary education is obviously undeniable in terms of generating highly skilled workers who drive toward growth and achieving a high-income economy. Briefly, the most important policy recommendation to the government is to position human capital development at the center of its development strategy.

Future studies can examine the influence of education levels on economic growth. They can focus on examining a more extensive sample size for their examination of potential associations, and they can disaggregate the samples using other criteria (e.g., income level).

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References

- Abbas, Qaisar. (2001), "Endogenous growth and human capital: A comparative study of Pakistan and Sri Lanka," *The Pakistan Development Review*, 40(4), 987-1007.
- Agasisti, Tommaso, and Alice Bertoletti. (2020), "Higher education and economic growth: A longitudinal study of European regions 2000–2017," *Socio-Economic Planning Sciences*, 100940.
- Agiomirgianakis, George, Dimitrios Asteriou, and Vassilis Monastiriotis. (2002), "Human capital and economic growth revisited: A dynamic panel data study," *International advances in economic research*, 8(3), 177-187.
- Akkari, Abdeljalil. (2004), "Education in the Middle East and North Africa: The current situation and future challenges," *International Education Journal*, 5(2), 144-153.
- Amaghous, J, and A Ibourk. (2013), "Education and economic growth in the MENA region: Some new evidence," *Journal of Economics and Sustainable Development*, 4(8), 34-45.
- Amir, Hina, Muhammad Khan, and Kanwal Bilal. (2015), "Impact of educated labor force on economic growth of Pakistan: a human capital perspective," *Eur Online J Nat Soc Sci*, 4(4), 814-831.
- Atiq-ur-Rehman, Muhammad, Suleman Ghaffar, Kanwal Shahzadi, and Rabail Ghazanfar. (2020), "Human Capital Formation and Economic Growth in Emerging Asia: Empirical Evidence Using Panel Data," *Review of Applied Management & Social Science*, 3(2), 205-212.
- Awad, Atif, Noreha Halid, and Ishak Yussof. (2013), "The impact of human capital on economic growth: the case of selected Arab countries," *International Journal of West Asian Studies*, 5(2), 79-96.
- Barro, Robert J. (1996), Determinants of economic growth: A cross-country empirical study, No. w5698: National Bureau of Economic Research, WP 5698.
- Barro, Robert J. (2001), "Human capital and growth," *The American Economic Review*, 91(2), 12-17.

Bayraktar-Sağlam, Bahar. (2016), "The Stages of Human Capital and Economic Growth: Does the Direction of Causality Matter for the Rich and the Poor?," *Social Indicators Research*, 127(1), 243-302.

Becker, Gary. (1964), *Human Capital*, National Bureau of Economic Research, New York: Columbia University Press.

Benhabib, Jess, and Mark M Spiegel. (1994), "The role of human capital in economic development evidence from aggregate cross-country data," *Journal of Monetary economics*, 34(2), 143-173.

Benos, Nikos, and Stelios Karagiannis. (2010), "The role of human capital in economic growth: evidence from Greek regions," *Institutional and social dynamics of growth and distribution*, 137-168.

Bowman, Mary Jean. (1966), "The human investment revolution in economic thought," *Sociology of education*, 39(2), 111-137.

Choi, In. (2001), "Unit root tests for panel data," *Journal of international money and Finance*, 20(2), 249-272.

Dao, Binh, and Ngoc Hieu Trinh. (2020), "Education and Economic Growth in Vietnam," *Journal of Education and Practice*, 11(6), 10-22.

Denison, Edward F. (1967), *Why Growth Rates Differ* (The Brookings Institutions, Washington, DC).

Deniz, Zeynep, and A Suut Dogruel. (2008), "Disaggregated Education Data and Growth: Some Facts from Turkey and MENA Countries," *Topics in Middle Eastern and North African Economies*, electronic journal, 10, Middle East Economic Association and Loyola University Chicago, <http://www.luc.edu/orgs/meea/>.

Edrees, Abdelbagi. (2016), "Human capital, infrastructure and economic growth in Arab world: a panel granger causality analysis," *Business and Economics Journal*, 7(1), 1-5.

El Alaoui, Aicha. (2016), "Impact of women's education on the economic growth: An empirical analysis applied to Morocco, Algeria, Tunisia, and Egypt," *International Journal of Social Sciences and Education Research*, 2(3), 960-979.

Fisher, RA. (1932), *Statistical Methods for Research Workers*: 4th Edn
Edinburgh: Oliver and Boyd.

Gebrehiwot, Kidanemariam Gidey. (2016), "The Impact of Human Capital Development on Economic Growth in Ethiopia: Evidence from ARDL Approach to Co-Integration," *Bahir Dar Journal of Education*, 16(1), 34-55.

Gyimah-Brempong, Kwabena, Oliver Paddison, and Workie Mitiku. (2006), "Higher education and economic growth in Africa," *The Journal of Development Studies*, 42(3), 509-529.

Hanif, Nadia, and Noman Arshed. (2016), "Relationship between school education and economic growth: SAARC countries," *International Journal of Economics and Financial Issues*, 6(1), 294-300.

Heyneman, Stephen P. (1997), "The quality of education in the Middle East and North Africa (MENA)," *International Journal of Educational Development*, 17(4), 449-466.

Jalil, Abdul, and Muhammad Idrees. (2013), "Modeling the impact of education on the economic growth: Evidence from aggregated and disaggregated time series data of Pakistan," *Economic Modelling*, 31(March 2013), 383-388.

Jamel, Lamia, Monia Ben Ltaifa, Ahmed K Elnagar, Abdelkader Derbali, and Ali Lamouchi. (2020), "The Nexus between Education and Economic Growth: Analyzing Empirically a Case of Middle-Income Countries," *Virtual Economics*, 3(2), 43-60.

Kalaitzidakis, Pantelis, Theofanis P Mamuneas, Andreas Savvides, and Thanasis Stengos. (2001), "Measures of human capital and nonlinearities in economic growth," *Journal of Economic Growth*, 6(3), 229-254.

Karimi, Mohammad Sharif, Kiomars Sohaili, and Freshteh Ebrahimi. (2020), "Relationship between women's education and economic growth (case study selected Islamic countries)," *Quarterly Journal of The Macro and Strategic Policies*, 7(28), 121-140.

Kaur, Navneet Gill, and Jelena Letic. (2012), *Female Education and Economic Growth: theoretical overview and two country cases*: School of Business, Economics and Law, University of Gothenburg. Unpolished Thesis.

Khan, Mussarat Khadija. (2016), "Contribution of female human capital in economic growth: an empirical analysis of Pakistan (1972–2012)," *Quality & Quantity*, 50(2), 709-728.

Knowles, Stephen, Paula K Lorgelly, and P Dorian Owen. (2002), "Are educational gender gaps a brake on economic development? Some cross - country empirical evidence," *Oxford economic papers*, 54(1), 118-149.

Kyophilavong, Phouphet, Keiichi Ogawa, Byoungki Kim, and Khamlusa Nouansavanh. (2018), "Does Education Promote Economic Growth in Lao PDR?: Evidence From Cointegration And Granger Causality Approaches," *The Journal of Developing Areas*, 52(2), 1-11.

Laoufi, Hakima, Adem Hadidi, and Elabbes Bahnas. (2020), "Investment In Education And Economic Growth: Ardl Model," *Economic Sciences, Management and Commercial Sciences Review*, 13(02), 39-50.

Latif, Nurul Wahidah Abdul, Nora Yusma Mohamed Yusoff, and Kwe Lu Tan. (2011), "Empirical Analysis between Human Capital and Economic Growth in Malaysia from 1975 to 2009: An ARDL Approach," *Terengganu International Finance and Economics Journal (TIFEJ)*, 1(2), 26-34.

Lawanson, O.I. (2017), "Human Capital Investment and Economic Development in Nigeria: a Focus on Education and Health," *Journal of Economics and Policy Analysis*, 2(1), 95-112.

Lee, Keun, and Byung-Yeon Kim. (2009), "Both institutions and policies matter but differently for different income groups of countries: determinants of long-run economic growth revisited," *World Development*, 37(3), 533-549.

Lutz, Wolfgang, Jesus Crespo Cuaresma, and Warren Sanderson. (2008), "The demography of educational attainment and economic growth," *Science* 319(5866), 1047-1048.

Maddala, Gangadharrao S, and Shaowen Wu. (1999), "A comparative study of unit root tests with panel data and a new simple test," *Oxford Bulletin of Economics and statistics*, 61(S1), 631-652.

Mankiw, N Gregory, David Romer, and David N Weil. (1992), "A contribution to the empirics of economic growth," *The quarterly journal of economics*, 107(2), 407-437.

Masri, Safwan, and Katherine Wilkens. (2011), "Higher education reform in the Arab world," The Brookings Project on US Relations with the Islamic World. U.S.-Islamic World Forum Papers.

Murphy, Kevin M, Andrei Shleifer, and Robert W Vishny. (1991), "The allocation of talent: Implications for growth," *The quarterly journal of economics*, 106(2), 503-530.

Nurudeen, Abu, and Abdullahi Usman. (2010), "Government expenditure and economic growth in Nigeria, 1970-2008: A disaggregated analysis," *Business and economics journal*, Volume 2010(BEJ-4), 1-11.

Ogundari, Kolawole, and Titus Awokuse. (2018), "Human capital contribution to economic growth in Sub-Saharan Africa: Does health status matter more than education?," *Economic Analysis and Policy*, 58(June 2018), 131-140.

Omodero, Cordelia Onyinyechi, and Kanalechi CK Nwangwa. (2020), "Higher Education and Economic Growth of Nigeria: Evidence from Co-Integration and Granger Causality Examination," *International Journal of Higher Education*, 9(3), 173-182.

Orisadare, MA, A Olabisi, and OG Olanrewaju. (2018), "A Gender Analysis of The Effects of Human Capital Development on Economic Growth in Nigeria," *African Journal of Applied Research (AJAR)*, 3(2), 85-96.

Oztunc, Hakan, Zar Chi Oo, and Zehra Vildan Serin. (2015), "Effects of female education on economic growth: A cross country empirical study," *Educational Sciences: Theory & Practice*, 15(2), 349-357.

Pegkas, Panagiotis. (2014), "The link between educational levels and economic growth: a neoclassical approach for the case of Greece," *International Journal of Applied Economics*, 11(2), 38-54.

Pissarides, Christopher A, and Marie Ange Véganzonès-Varoudakis. (2006), Labor markets and economic growth in the MENA region, Vol, 278, Contributions to Economic Analysis.

Raifu, Isiaka. (2019), Economic growth in Africa: Does gender education still matter?, Vol, MPRA Paper No. 92916 Munich Personal RePEc Archive.

Romer, DAVID. (2001), Advanced Macroeconomics: The MacGraw-Hall Co.

Romer, Paul M. (1989), Human capital and growth: theory and evidence (No. w3173): National Bureau of Economic Research.

Schultz, Theodore W. (1961), "Investment in human capital," *The American economic review*, 51(1), 1-17.

Sehrawat, Madhu, and AK Giri. (2017), "Does female human capital contribute to economic growth in india?: an empirical investigation," *International Journal of Social Economics*, 44(11), 1506-1521.

Self, Sharmistha, and Richard Grabowski. (2004), "Does education at all levels cause growth? India, a case study," *Economics of Education Review*, 23(1), 47-55.

Self, Sharmistha, and Richard Grabowski. (2008), "Examining the Link Between Japan's Development and Education of Females," *Pacific Economic Review*, 13(3), 279-288.

Shaihani, M, A Harisb, N Ismaila, and R Saida. (2011), "Long run and short run effects on education levels: Case in Malaysia," *International Journal of Economic Research*, 2(6), 77-87.

Shalini, N, AH Baharom, and Harpaljit Kaur. (2012), Human Capital and Economic Growth: Does Gender Matter?, Paper read at Proceedings of USM-AUT International Conference 2012 Sustainable Economic Development: Policies and Strategies.

Singh, Nirmal Kaur Hari, Lai Wei Sieng, and Mohd Nasir Mohd Saukani. (2018), "Impact of education levels on economic growth in Malaysia: A gender base analysis," *Geografia-Malaysian Journal of Society and Space*, 14(4), 13-26.

Sterlacchini, Alessandro. (2008), "R&D, higher education and regional growth: Uneven linkages among European regions," *Research Policy*, 37(6-7), 1096-1107.

Stevens, Philip, and Martin Weale. (2004), Education and economic growth: International handbook on the economics of education, 27, 205-311.

Sun, Cheng. (2020), "Effect of Higher Education on GDP in Chongqing Based on VAR Model," *International Journal of Social Science and Education Research*, 3(4), 52-59.

Suri, Tavneet, Michael A Boozar, Gustav Ranis, and Frances Stewart. (2011), "Paths to success: The relationship between human development and economic growth," *World Development*, 39(4), 506-522.

Tansel, A, and ND Güngör. (2012), "Gender effects of education on economic development in Turkey," *Discussion Paper, No. 2012/19, Turkish Economic Association, Ankara*.

Tsai, Chun-Li, Ming-Cheng Hung, and Kevin Harriott. (2010), "Human capital composition and economic growth," *Social Indicators Research*, 99(1), 41-59.

UNDP. (2018), Human Development Reports, <http://hdr.undp.org/en/data>.

Wolff, Edward, and Maury Gittleman. (1993), The role of education in productivity convergence: does higher education matter?: In Explaining economic growth (pp. 147-167). Elsevier Science Publishers. .

World Bank. (2020), World development indicators, Retrieved from <https://databank.worldbank.org/source/world-development-indicators>. .

Corruption and Public Debt in Developing Countries: Role of Institutional Quality

Marium Naz¹ and Bushra Yasmin²

ABSTRACT

This study investigates the effect of corruption on public debt in selected Asian and African developing countries for the time period 1990-2016. The System Generalized Method of Moment (GMM) is applied on three measures of corruption by ICRG, transparency International and Worldwide Governance Indicators. The findings suggest that corruption leads to high public debt accumulation in Asian and African countries however the intensity of this relationship is sharper for the African region than the Asian. The study found the role of institutional quality as mitigating in the corruption-debt relationship. And the computed threshold level of institutional quality provides 4 and 3.66 for Asia and Africa as benchmark, respectively that can offset the adverse effect of corruption on public debt. The study also elucidates the findings by computing marginal effects of corruption on public debt at various levels of country-specific institutional quality which reflect the relative standing of each country. Overall, empirical findings suggest adopting effective measures to combat corruption to reduce public debt burden in both regions. A strong judicial system around the anti-corruption strategies and improvement in institutional quality can lower the debt burden through effective control of corruption. Besides, the debt burden situation of the regions can be improved by bolstering GDP as well.

ملخص

تبحث هذه الدراسة في تأثير الفساد على الدين العام في بلدان نامية آسيوية وأفريقية مختارة للفترة الزمنية الممتدة ما بين 1990 و 2016. ويتم تطبيق أسلوب اللحظات المعمم (GMM) على ثلاثة مقاييس للفساد من قبل الدليل الدولي لتقييم المخاطر في البلدان (ICRG) والشفافية الدولية ومؤشرات الحوكمة العالمية. وتشير النتائج إلى أن الفساد يؤدي إلى ارتفاع تراكم الديون العامة في البلدان

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الآسيوية والأفريقية، ولكن هذه العلاقة أكثر حدة بالنسبة للمنطقة الأفريقية من الآسيوية. ووجدت الدراسة أن الجودة المؤسسية تلعب دورا في التخفيف من علاقة الفساد بالديون. ويولي مستوى العتبة المحسوبة للجودة المؤسسية معيار 4 و 3.66 لآسيا وأفريقيا، على التوالي، الأمر الذي من شأنه أن يعوض الأثر السلبي للفساد على الدين العام. وتوضح الدراسة أيضا النتائج من خلال حساب الآثار الهامشية للفساد على الدين العام على مستويات مختلفة من الجودة المؤسسية الخاصة بكل بلد والتي تعكس المكانة النسبية لكل بلد. وبشكل عام، تشير النتائج التجريبية إلى اعتماد تدابير فعالة لمكافحة الفساد للحد من عبء الدين العام في كلا المنطقتين. كما أن وجود نظام قضائي قوي بشأن استراتيجيات مكافحة الفساد وتحسين الجودة المؤسسية من شأنه أن يقلل من عبء الديون من خلال السيطرة الفعالة على الفساد. وإلى جانب ذلك، يمكن تحسين وضع عبء الديون في المنطقتين من خلال تعزيز الناتج المحلي الإجمالي أيضا.

ABSTRAITE

Cette étude examine l'effet de la corruption sur la dette publique dans certains pays en développement asiatiques et africains pour la période 1990-2016. La Méthode Généralisée des Moments (GMM) est appliquée sur trois mesures de la corruption par ICRG, Transparency International et Worldwide Governance Indicators. Les résultats suggèrent que la corruption conduit à une forte accumulation de la dette publique dans les pays asiatiques et africains, mais l'intensité de cette relation est plus forte dans la région africaine que dans la région asiatique. L'étude a révélé le rôle de la qualité institutionnelle comme facteur d'atténuation de la relation corruption-dette. Et le niveau seuil calculé de la qualité institutionnelle fournit 4 et 3,66 pour l'Asie et l'Afrique comme référence, respectivement, qui peut compenser l'effet négatif de la corruption sur la dette publique. L'étude élucide également les résultats en calculant les effets marginaux de la corruption sur la dette publique à différents niveaux de qualité institutionnelle spécifique au pays, qui reflètent la position relative de chaque pays. Dans l'ensemble, les résultats empiriques suggèrent l'adoption de mesures efficaces de lutte contre la corruption pour réduire le poids de la dette publique dans les deux régions. Un système judiciaire solide entourant les stratégies de lutte contre la corruption et l'amélioration de la qualité institutionnelle peuvent réduire le fardeau de la dette grâce à un contrôle efficace de la corruption. En outre, la situation de la dette des régions peut être améliorée en soutenant le PIB ainsi que la croissance économique.

Key Words: Public Debt; Corruption; Developing Countries; System-GMM

JEL Codes: D73; H63

1. Introduction

Corruption generally refers to the rent seeking behavior of public officials where the discretionary power of public officials leads to the advent of corruption. The issue of corruption started gaining scholarly attention during 1980-90s in the wake of financial and industrial revolution that accompanied with the financial liberalization process in developing countries leading its way to corruption, particularly in the countries where the law and order was weak (Robb, 1992). According to Corruption Perception Index report (2018), two-third of 180 countries are placed below the average score of corruption indicating high corruption where Asian and African countries are among the worst performers.³ Two major events; Asian financial crisis in 1997-98 and corruption scandals of high-level government officials during 90's underscored corruption as a major issue in Asia. While the wave of corruption in African region step in through colonialism when corruption penetrated widely in societies and the post-colonial independence of African countries inherited it as a way of life. The misuse of revenues by the government officials and corruption in the natural resources left the region incapable to improve the living standards of its citizens and it lagged in many ways consequently (Lumumba, 2011). Overall, corruption has remained a major threat to the Asian and African countries' stability and economic growth.

The literature on corruption identified it as detrimental for economic growth through its negative bearing on investment and because it diverts the government expenditure towards non-development sectors ((Mauro, 1998; Tanzi and Davoodi, 2002; Dellavallade, 2006). Moreover, the excessive increase in public expenditures as a cover of corruption can generate large fiscal deficit and the public borrowings to finance this deficit translates into further debt accumulation. According to Benfratello, Monte and Pennacchio (2018), corruption tends to reduce economic growth which in turn enlarges the public debt, on the one hand while the corrupt public officials create fiscal imbalance by widening the gap between expenditures and revenues, on the other and both ways ultimately lead to enlarge the public debt.

After the Global Financial Crisis (2008-09), massively rising public debt has been witnessed due to large fiscal deficits. Though, internal

³ The CPI (2018) used the scale ranging from 0 to 100, where 0 shows highly corrupt and 100 depicts least corrupt country.

borrowings can fill in the saving-investment gap and help the countries in achieving their macroeconomic goals however its success largely hinges on the proper and efficient utilization of borrowed funds. Otherwise, the prevalent corruption can exert a pressure on the economy by exacerbating debt liabilities and can hamper the process of economic development.

With this background, this study aims to empirically investigate the effect of corruption on public debt for a panel of 83 Asian and African developing countries along with providing a comparative analysis of the regions over the time period 1990-2016.⁴ As the weak structural and institutional framework in developing countries is expected to make debt and corruption unmanageable side by side, this study also investigates the intervening role of institutional quality in the corruption-public debt relationship. Literature mostly uses only one or the other measure of corruption, while this study employs three measures of corruption including corruption indexes by Transparency International, International Country Risk Guide and Worldwide Governance Indicator and is expected to provide more robust analysis. The study also elucidates the findings with computed marginal effects of corruption on public debt at various levels of country-specific institutional quality (measured by polity 2) which provides threshold level of institutional quality of both regions. Hence, the study is expected to contribute to literature in many significant ways.

The rest of the paper is organized as follows; section 2 provides the historical evolution of corruption and public debt in developing countries. Third section provides the literature review. Section four presents the methodology including model specification and data description with the justification of variables. Section five reports the empirical results and discussion, and last section concludes the paper with some policy implications.

⁴ The developing countries are selected based on the World Bank classification.

2. Historical Background

2.1. Evidence from Asian Countries

The latest Corruption Perception Index (CPI) of Asian countries shows that more than two third of Asian countries received score below than average global score of forty-three. According to Quah (2003), factors responsible for corruption are low salaries of civil servants, lack of political commitment, high opportunity of corruption and low risk of detection and punishment. During the colonial period, survival became difficult for workers due to low wages which ultimately paved the ways for corruption.

During early 1990s, corruption was comparatively low but printed and mass media started highlighting corruption in government institutions across the Asian region sternly. Later, Asian financial crisis (1997) identified the widespread corruption and nepotism in Thailand, South Korea, Malaysia and Indonesia and stressed on the need of transparency and accountability in these countries (Moran, 1999). The wave of political corruption gained momentum during 2001 when the political leaders in Indonesia, China, Philippines and Thailand were found involved in the act of corruption.

However, after Asian regional crisis, Asian countries especially Indonesia, Malaysia and Thailand adopted various structural reforms and succeeded in implementing the anti-corruption policies effectively. This include anti-corruption initiative in Asia-Pacific under the combined leadership of Asian Development Bank (ADB) and Organization for Economic Co-operation and Development (OECD) that was specifically introduced to control rising corruption in the region.

On the public debt front. Jordan, Iraq and Cyprus have highest debt as percentage of their GDP while in Oman, Kazakhstan and Azerbaijan it is observed as comparatively low (World Economic Outlook, 2018). After recovering from the regional financial crisis, Asian economies started growing again and they started targeting domestic debt markets to reduce foreign currency mismatches and currency risks. Asian capital and bond markets grew faster than many of the mature markets and the share of public debt tremendously increased (Goswami and Sharma, 2011). In the aftermath of financial crises, domestic debt continued to rise with a

declining external debt in Southeast Asian region. Later in years 1998-99, the fiscal consolidations eliminated the budgetary deficits in Asia and minimized domestic financing and excessive public debt (IMF, 2000). However, global financial crisis during 2007-08 intensified the problem that forced the countries to revive their economies through further borrowing. Despite a sharp increase in economic growth and drop down fiscal deficit to 2.6 percent from 3.7 percent in a year from 2010 to 2011, debt to GDP ratio remained high. Not only that the Asian countries borrowed heavily from external sources after financial crises but also the half of the global debt was issued to the emerging economies in Asia.

2.2. Evidence from African Countries

According to Transparency International (2018), Somalia and South Sudan in African region are extremely corrupt countries among one eighty countries. While the Sub-Saharan Africa is declared as worst performing region with an average score of 33 on corruption index. In our sample only six out of fifty-four African countries scored above the average level of corruption indicating relatively better standing on corruption score.

Africa, despite being a resource rich region with abundance of mineral resources, has been lagging behind in terms of economic development since 1960. McFerson (2009) regarded the corruption as main factor responsible for low economic development as the revenues generated from natural resources and more specifically from oil reserves have been misutilized since long. According to the estimates of African Union (2002), 25 percent of GDP is lost in African states due to corruption making it US dollars 148 billion.⁵

Ayee (2002) and Lumumba (2011) identified the poor leadership, inadequate remunerations to public officials, nepotism and patronage, and weak judicial system as the pertinent reasons behind corruption in African countries. Many African countries such as Nigeria, Tanzania, and Democratic Republic of Congo institutionalized corruption during 1960's and 1970's due to civil servants' malpractices. Later, shift from traditional society to modern states created new source of wealth (and power) and provided more avenues for corruption in the public services. According to Brown (2014), police and custom officers were the main offenders in

⁵ C.f. <https://www.oecd.org/cleangovbiz/49693613.pdf>

African countries as they extract the resources from public forcibly. Furthermore, difficult government procedures in public services also became a reason of growing corruption (Masabo, 2014). During late 90s, African countries adopted anti-corruption measures to reduce corruption which could not be materialized due to non-implementation of measures effectively. However, in recent years African countries paid attention to improve their performance due to its damaging effects on the economy. And the average CPI score of the region improved as compared to previous years but it remained below than the average global level.

Regarding the debt situation of region, many African countries started developing domestic debt markets with the support of International Financial Institutions during 2000s. African Development Bank launched African domestic bond fund in 2010 and International Finance Corporation in 2012. The local currency debt markets in Africa were also opened for non-residents and the participation of non-residents widens the investor base. Moreover, external debt relief under the initiatives of International Monetary Fund and World Bank changed the composition of public debt where domestic debt become major component. Specifically, the inability of debt servicing due to sharp decline in petroleum export revenues created debt-overhang in Nigeria. By 2005, country appeared on the list of world's most heavily indebted countries owing to US dollars 35.994 billion. In 2006, the agreement with London and Paris Club reduced almost US dollars 30 billion external debt and the country was removed from the list of highly indebted countries. However, the domestic debt was still over US dollars 10.13 billion and touched a figure of US dollars 30 billion in 2011 (Ogunyemi, 2011).

3. Literature Review

Macroeconomic literature provides contrasting views regarding the public debt where some economists believe that high dependence on public debt generates fiscal and monetary instability leading to economic burden (Say, 1880) while many argued that effective utilization of public borrowings can enhance the economic growth and productive capacity of the economy (Krugman, 1988).

Classical economists believe that public borrowing is not a desirable policy to finance government expenditures because it transfers to the next generation in the form of heavy taxes. Conversely, Keynes' and their

followers justified public debt and stressed on the need of borrowing to take the economy out of recession. In contrast, the New Classical and Rational Expectation Economist, Barro (1974) provided that public debt has no wealth effect.⁶

The public choice theory has remained the major focused theory in explaining the corruption behavior. Rose-Ackerman (1978) regarded the bureaucratic market structure as one of the major reasons of corruption which rolls out the possibility of corruption on the ground of cost-benefit analysis, whenever expected advantage outweighs the cost attached (penalty of being caught and punished) the public officials set to be corrupt. Particularly, rent-seeking model and principal-agent model deals with the causes of corruption in this regard. Krueger (1974) provided a macroeconomic perspective through rent-seeking model and argued that quantitative restrictions imposed by the government results in competition among the individuals for rent which excites the corrupt activities. On the other hand, theory of agency relationship by Ross (1973) focuses on the microeconomic aspect and postulates that agency relationship among two or more parties arises when 'the agent' act on behalf of 'the principal' and both parties tend to maximize their utilities and the deviation from common interest impart a cost on the principal. In the same context, Shleifer and Vishny (1993) connoted the microeconomic theory with its macroeconomic implications and asserted that generally the high-level government acts as principal while the low-level official as agent. And the cost of corruption tends to be higher when the central government is weak in curtailing any outside pressure to handle corruption especially when it comes about government's resource generation and allocation for the provision of public goods and services. The institutional structure of government and the political process plays its own role in determining the level of corruption. Besides, the information asymmetry and uncertainties about costs are the major drivers of bureaucratic corruption. Advertently, corruption may incentivize the low public expenditures and resource allocation among the large and inefficient projects that might provide wider opportunity of rent-seeking leading towards an inefficient expenditure mechanism, as proposed by Pani (2009).

⁶ Ricardo believes that taxation and public borrowing are equivalent forms of financing public expenditures. See Ricardo (1817) for detail.

Overall, this background provides the justification for the inclusion of the role of institutional quality in corruption and public debt relationship. The most obvious cost of corruption is the risk of being caught and being punished that ultimately depends on how much effective the legal system of the country is and how much supportive is the institutional mechanism in the respective country.

A handful of empirical studies are conducted for the world economies on the issue and provides various determinants of public debt where the government expenditures, corruption and shadow economy appeared as major factors responsible for rising public debt. Besides, the domestic price level, foreign direct investment, population and government expenditure are some other determinants of public debt (Bon, 2015; Swamy, 2015).

Particularly, Fry (1997) explored the impact of alternative deficit-financing methods on economic growth for a panel of 66 countries including low income and emerging economies for 1979-1993. The study found market-based domestic debt as the least costly way of financing budget deficit than foreign borrowings. However, Singh (1999) found no co-integrating relationship between public debt and economic growth for India over the time period 1959-1995 and supported Ricardian equivalence which shows neutrality of domestic borrowings on economic growth in the long run.

The indirect role of corruption and shadow economy in rising public debt is highlighted precisely by Fernandez and Velasco (2014) for a panel of 17 regions of Spain for years 2000-2012. They argued that if state government raises funds through tax revenues, it pushes individuals to reduce their consumption which ultimately leads to enlarged shadow economy. And the government has to rely on the public borrowing resulting in public debt accumulation.

The complimentary nature of corruption and shadow economy in determining debt is later confirmed by Cooray, Dzhumashev and Schneider (2016) who investigated it for a panel of 126 countries over 1996-2012. Using two measures of corruption study proved that corruption leads to increase the public debt and the size of shadow economy magnifies the effect of corruption on public debt. For a segregated panel of 64 countries, Benfratello et al., (2018) investigated

the impact of corruption on public debt for the time 1995-2015. The study found a heterogeneous effect of corruption on public debt with sharper effect in high-income countries and weaker in low-income countries. On the other hand, Henri (2018) analyzed the effect of corruption on public debt for a panel of 29 Sub-Saharan African countries for 2000-2015 and the results of system GMM found significantly positive relationship between corruption and public debt because of inefficiencies in public spending. In particular, the inefficient allocation of public spending tends to increase the fiscal deficit which is financed through public and foreign debt in developing countries.

The non-linear relationship between corruption and public debt is recently investigated by Apergis (2019) for 120 countries over the time 1999-2015, who provided a regime-based analysis with a comparison of developed and developing countries. The findings suggest faster response of public debt to highly corrupt regime relative to the low corruption regime.

Regarding the reallocation of resources into non-productive sectors due to corruption, Mauro (1998) and Dellavallade (2006) provided the relationship between corruption and the composition of government expenditure for a cross section and developing countries over the time 1982-1995 and 1996-2001, respectively. The results showed that corruption favors expenditures on defense, fuel, energy and public services at the expense of social sectors which are unattractive for the rent-seekers. Similar result was obtained by Jajkowicz and Drobiszova (2015) for 21 OECD countries for 1998-2011. They argued that diverting the expenditures from social sector to defense and public services is due to maximum opportunity of bribe in later which are not easily monitored by the citizens as compared to social sector.

Although the link between corruption and public debt is widely analyzed but among several factors responsible for high public debt, institutional quality has not gained much attention which is expected to intervene significantly in the debt-corruption relationship. The institutional quality reflects the type of government system existing in respective country where generally the democratic government is supposed to be more vigilant in its transparency of actions due to accountability by the masses as compared with the autocracy. This hypothesis is checked in the study by controlling the indirect effect of institutional quality on public debt

through corruption. Moreover, this study provides country-specific marginal effects of corruption on public debt at various levels of institutional quality. And a comparative analysis of Asian and African countries provides deep insight into region-specific corruption-debt relationship, keeping into account the level of institutional quality in respective regions.

4. Data and Methodology

As discussed in section 3, public debt and corruption relation is based on the rent-seeking behavior of public officials derived from public choice theory that is expected to intensify the public debt burden. However, debt burden itself also gives rise to further debt accumulation ending in circular debt. This provides the justification for using lag value of debt to GDP ratio as regressor to capture its dynamic role. The previous year's debt increases the amortization payments for which government requires more borrowing resulting in public debt accumulation (Liu and Moldogaziev, 2017).

From that context, a dynamic specification of the model for Asian and African countries' panel for the period 1990-2016 is given as below:

$$DEBT_{it} = \alpha_0 + \alpha_1 DEBT_{it-1} + \alpha_2 CORR_{it} + \alpha_3 (CORR * POL)_{it} + \sum_{j=4}^n \alpha_j X_{jit} + \mu_{it} \quad (1)$$

Where, 'i' represents countries, 't' indicates years and 'j' stands for the number of control variables other than focused variables. $DEBT_{it}$ refers to ratio of domestic public debt to Gross Domestic Product, $DEBT_{it-1}$ is the lag of debt to GDP ratio as a measure of amortization payment, $CORR_{it}$ refers to the corruption that is measured in three ways; Corruption Perception Index by Transparency International (1993) which ranges from 0 (totally corrupt) to 10 (absence of corruption); secondly it is measured as the Control of Corruption Index (CCI) provided by Worldwide Governance Indicator (WGI), World Bank and ranges from -2.5 through +2.5 with positive values indicating greater control on corruption. Third measure of corruption is obtained from International Corruption Risk Guide (ICRG) provided by Political Risk Service (PRS) group. The index of control of corruption ranges from 0 (high level of

corruption) to 6 (low level of corruption).⁷ This is pertinent to mention that measures of corruption are rescaled on the same ground for the ease of interpretation following Benfratello et al., (2018) and Cooray, et al., (2016) and minimum value of corruption index for all measures indicates least corruption while the maximum value shows high corruption.

Similarly, $CORR * POL$ is the interaction of corruption and polity2 (an index for institutional quality). The polity index ranges from -10 to +10 where -10 stands for complete autocracy while +10 shows pure democracy. The polity index offers to observe its integrated role in the corruption-public debt relationship. Literature postulates positive link between democracy and quality of government and provides that more consolidated democracies can limit corruption more effectively than autocracies which are least capable in providing the quality government. (Pellegata, 2013; Kolstad and Wiig, 2011; Saha and Campbell 2007). The democratic governments are expected to be more cautious towards their practices due to prevalent competition among the political parties. Accordingly, literature highlights various intervening factors for the said link including level and exposure of democracy, economic development, education and law and order in respective regions (Charron and Lapuente, 2010; Bäck and Hadenius, 2008; Sung, 2004). In contrast Pellegata (2013) postulates that mere transition to democracy does not necessarily restrict the political corruption. Rather a fully formed mature democracy together with high level of economic development is fundamental to make the democratic system affirmative. Hence, the institutional quality can reduce public debt through control of corruption depending on the link between the interactive variables. The positive coefficient of debt would imply that democratic government is not able to curtail the corruption and hence its likely effects on the public debt and vice versa.

X_{jit} is the vector of other control variables including real GDP growth rate, $RGDP_{it}$, inflation, INF_{it} , interest payment on debt proxy for debt servicing, INT_{it} , military expenditures, MIL_{it} , and Population, POP_{it} .

The empirical model is estimated for the Asian and African countries separately and as a panel, with and without controlling interaction

⁷ The outlier countries have been removed from the sample while data screening.

variable. In the pooled regression, an intercept dummy, *dum-reg*, is added to capture the regional differences with assigned value 1 for Asia and 0 for Africa. Similarly, a slope dummy, *dum-CORR*, is included to control the comparative effect of corruption on public debt, with assigned value 1 for Asia and 0 for Africa.

The expected effect of corruption, lag of debt to GDP ratio, interest payment, military expenditure and population on public debt is positive. Corruption is expected to increase public debt by increasing government expenditure and lowering its revenues (Kaufman, 2010; Jajkowicz and Drobiszova, 2015). Similarly, an increase in military expenditure diverts the resources towards non-productive use while population increases the pressures on overall government expenditures which in turn results in more public debt (Thuku, Paul and Almadi, 2013).

In contrast, real GDP growth is considered as an effective tool to reduce the burden of public debt and is therefore expected to affect public debt negatively (Sinha, Arora and Bansal, 2011; Bon, 2015). Inflation can have either positive or negative effect on public debt due to ambiguity it entails. Marion (2009) and Akitoby, Komatsuzaki, and Binder (2014) stated that inflation means high taxes which increases government revenues and hence reduces the requirement of public debt. Comparatively, according to Bildirici and Ersin (2007) countries with high inflation are expected to face high cost of borrowings resulting in borrowings of low maturity domestic debts at high interest rates which eventually increases the debt burden.

The data on debt are extracted from World Economic Outlook (WEO), International Monetary Fund. The data of polity index is extracted from Polity-IV published by the Center for Systematic Peace (CSP) while data on all other variables except corruption are gathered from World Development Indicator (WDI), World Bank.

As the dynamic panel data model is likely to suffer from endogeneity due to presence of lagged dependent variable as regressor, Nickell (1981) and Anderson and Hsiao (1982) pointed out that the Ordinary Least Square yields inconsistent results and therefore Generalized Method of Moment (GMM) is the appropriate estimation technique. Arellano and Bond (1991) introduced first difference GMM technique that estimates the first

difference form of equation and uses lagged values of variables as instruments to solve the endogeneity problem.

However, Arellano and Bover (1995) and Blundell and Bond (1998) provided that for differenced equation the lagged values of variables are weak instruments which can result in biased estimates for small sample. Therefore, they introduced system GMM estimation technique, which is an extension to the difference GMM equation by introducing additional linear moment conditions. This technique combines the difference and level equations and takes first difference form of variables as instruments in the level equation. Moreover, it assumes that the differenced variables are uncorrelated with country specific effects. The Hansen/Sargan test of over-identifying restrictions will be used for instrumental validity. While the second order serial correlation test will be applied using AR (2) at 5% level of significance.

5. Results and Discussion

5.1 System-GMM Estimates for Pooled Data

The empirical findings of System-Generalized Method of Moment (S-GMM) are reported in Table 5.1. The results are reported for ICRG, Transparency International and Worldwide Governance Indicator of corruption in equations 1 through 6 without and with controlling interaction variable, respectively. The lower panel yields the diagnostic tests' results which indicate the goodness of fit of the empirical models. Hansen J-statistic range from 0.253-0.982 and indicate that selected instruments are exogenous. Similarly, AR (2) test ranges from 0.153-0.425 indicating no serial correlation in the residuals. The signs and significance of the variables remain consistent throughout the regressions.

Corruption appeared positive and statistically significant in all equations implying positive impact on public debt during the given time period. The coefficient values show that one unit increase in corruption leads to 0.71, 0.51 and 0.80 unit increase in public debt to GDP ratio in three equations, respectively when interaction of institutional quality with corruption is not controlled. However, after controlling the interaction of corruption and institutional quality, the said effect tends to decline by reasonable margin as reported in equation (2), (4) and (6). The results are in line with Cooray et. al., (2016) and Henri (2018).

Corruption increases the public debt by expanding government expenditures and reducing government revenues. Where, the government expenditure increases due to rent-seeking behavior of corrupt officials who increases the expenditures in those sectors where huge rent can be grabbed like infrastructure and defense. Alternatively, government revenues tend to decline because large portion of it goes into bribery. Overall, this leads to the rising fiscal deficit and distorts public finances in the country resulting in accelerating debt.

The regional dummy shows public debt in Asian countries statistically significantly more than in African countries. Asian financial crisis (1997-98) and global financial crises (2008-09) largely affected Asian countries due to more liberalized financial policies as compared to Africa that resulted in huge public debt. However, the effect of corruption on public debt, measured by the slope dummy, is relatively low in Asian countries than African as the coefficient of slope dummy appeared as statistically significantly negative in all equations. The reason behind may be the better institutions and governance and clear legal and budgetary management in Asian countries as compared to the African countries.

The lag of debt to GDP ratio is statistically significantly positive providing that public debt in previous period tends to increase debt in the next which provides evidence for large amortization payments in selected countries. Due to improper utilization of borrowed funds the capability of government to payback tends to decline that leads to increasing public debt in subsequent periods. The result is consistent with Benfratello, et. al. (2018).

In contrast, the real GDP growth shows negative effect on public debt due to its positive role in generating revenues to meet expenditure obligations and to reduce debt burden. The result is like Sinha et al., (2011). The impact of interest payment on public debt is statistically significantly negative as expected and shows that increase in interest payment increases the cost of borrowing and therefore reduces its demand. Military expenditure has positive but insignificant impact on public debt for the pool of Asian and African countries. Similarly, population and inflation appeared as insignificant with positive sign.

The role of institutional quality in the corruption-public debt relationship as an interaction of corruption and polity index shows negative sign in equations (2), (4) and (6). As the results for interaction are not directly observable, they are discussed in detail in section 5.3.

Table 5.1: SGMM Estimates of Corruption on Public Debt (Pooled Data)

Dependent Variable: Public Debt to GDP ratio						
	ICRG		TI		WGI	
Variables	Without interaction	With interaction	Without interaction	With interaction	Without interaction	With interaction
<i>L. DEBT</i>	0.855*** (0.156)	0.875*** (0.118)	0.608*** (0.208)	0.876*** (0.103)	0.706*** (0.245)	0.859*** (0.109)
<i>CORR</i>	0.718** (0.311)	0.159* (0.087)	0.517** (0.227)	0.129** (0.057)	0.807* (0.415)	0.383** (0.178)
<i>RGDP</i>	-0.039*** (0.014)	-0.002* (0.001)	-0.067** (0.030)	-0.016** (0.006)	-0.033*** (0.013)	-0.024*** (0.009)
<i>INT</i>	-0.038*** (0.014)	-0.013** (0.006)	-0.035*** (0.014)	-0.006* (0.003)	-0.026* (0.146)	-0.004 (0.003)
<i>INF</i>	-0.001 (0.001)	-0.001 (0.001)	-0.003 (0.004)	-0.000 (0.001)	-0.002 (0.003)	-0.001 (0.001)
<i>MIL</i>	0.013 (0.028)	0.000 (0.015)	0.002 (0.036)	0.003 (0.020)	0.000 (0.024)	0.001 (0.020)
<i>POP</i>	0.003 (0.002)	0.001 (0.002)	0.013 (0.009)	0.000 (0.000)	0.023 (0.010)	0.000 (0.000)
<i>dum_reg</i>	2.765* (1.636)	1.040* (0.579)	3.287* (1.874)	1.726** (0.827)	0.505* (0.298)	0.377* (0.205)

Dependent Variable: Public Debt to GDP ratio					
	ICRG		TI		WGI
<i>dum_CORR</i>	-0.838* (0.494)	-0.369** (0.171)	-0.490* (0.261)	-0.242** (0.112)	-0.719* (0.381)
<i>(CORR * POL)</i>	-	-0.002* (0.001)	-	-0.001* (0.000)	-
N	705	589	712	603	547
No. of instruments	24	38	21	31	35
<i>Diagnostic Tests</i>					
Hansen J Test	0.253	0.678	0.881	0.689	0.982
AR(2) Test	0.425	0.157	0.153	0.159	0.337

Note: 1) *, ** and *** represents significance at 10%, 5% and 1%, respectively. 2) Standard errors in parentheses. 3) Reported results for diagnostic tests are p-values. 4) Instrumented variables used in the estimations are lags (1-4) for *MLL*, lags (1-2) for *DEBT*, lags (1-4) for *INT*, lag (1-2) for *RGDP*, lags (1-4) for *INF*, lags (1-3) for *POP* and lags (1-3) for *C*

5.2 Comparative Estimates for Asian and African Countries

Table 5.2 provides the estimates of Asian and African panel separately. The bottom panel of the table shows the results of diagnostic tests where p-value of Hansen-J test range from 0.817-0.995 validating the instruments. The p-values of AR (2) test range from 0.121-0.975 verifying no second order serial correlation. The results for corruption are by and large the same for both regions in terms of its coefficients signs however the effect is statistically significantly higher for African region than Asian for the corruption measured by TI and WGI. The results are consistent with the result of regional slope dummy as reported in Table 5.1. The underlying reasons are the same as good governance, better budgetary management and the rule of law and property rights tend to reduce the impact of corruption on public debt (Cooray *et. al.*, 2016).

The coefficient of lag of debt is significantly positive and provides the evidence of larger amortization payments in Asian than African countries. The improper allocation of borrowed funds depresses the debt repayment capacity of the country leading towards increasing public debt in subsequent periods. Military expenditures appeared statistically significantly positive only in the equations without controlling the interaction which implies that the controlled institutional quality nullify the effect of defense expenditures on public debt.

Real GDP growth has negative effect on public debt in all equations. Although, Asian countries grew faster after the regional financial crisis but in recent years these economies are slowing down in terms of output growth, the annual GDP growth rate was 6.03 percent in 2003 that declined to 4.75 percent in 2016 while the debt has been increased sharply. On the other hand, African countries are expanding in terms of output growth; the annual GDP growth rate increased to 3.5 percent in 2016.

As the result for population, inflation and interest payment appeared as significant only for African region, the test of equality of the coefficient remains invalid. Specifically, the population has significantly positive

effect on debt while inflation and interest rate have negative effect on the public debt in Africa. Africa region is among the fastest population growing region at average annual rate of 2.5 percent and the rate is expected to increase in coming decades. The growing population put upward pressure on fiscal deficit and hence debt. The result is consistent with Swamy (2015). The effect of inflation is quite negligible though significant. On the same count, the impact of interest payment on public debt appeared statistically significantly negative due to high cost of borrowing.

Dependent Variable: Public Debt to GDP Ratio														
Variables	Asian Countries						African Countries							
	(ICRG)		(TI)		(WGI)		(ICRG)		(TI)		(WGI)		(WGI)	
<i>RGDP_{it}</i>	-0.002*** (0.000)	-0.003*** (0.001)	-0.001** (0.000)	-0.002** (0.001)	-0.001* (0.000)	-0.001** (0.000)	-0.004*** (0.001)	0.004*** (0.001)	0.011*** (0.003)	-0.015*** (0.004)	-0.012* (0.007)	-0.012*** (0.004)	-0.012*** (0.004)	-0.012*** (0.004)
<i>IP_{it}</i>	-0.013 (0.012)	-0.018 (0.011)	-0.053 (0.059)	-0.003 (0.006)	-0.050 (0.063)	-0.006 (0.005)	-0.009*** (0.002)	-0.007*** (0.001)	-0.008*** (0.002)	-0.008*** (0.002)	-0.009* (0.005)	-0.010*** (0.004)	-0.010*** (0.004)	-0.010*** (0.004)
<i>INF_{it}</i>	-0.000 (0.001)	-0.000 (0.002)	-0.003 (0.002)	-0.000 (0.000)	-0.002 (0.002)	-0.000 (0.000)	-0.001** (0.000)	-0.001*** (0.000)	-0.0008* (0.000)	-0.0005* (0.000)	-0.010* (0.004)	-0.008** (0.004)	-0.008** (0.004)	-0.008** (0.004)
<i>POP_{it}</i>	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.012*** (0.004)	0.008** (0.003)	0.014*** (0.003)	0.013*** (0.003)	0.017* (0.010)	0.018*** (0.007)	0.018*** (0.007)	0.018*** (0.007)
<i>(CORR</i> <i>* POL)</i>	- (0.0003)	-0.0007** (0.0003)	- (0.008)	-0.001* (0.008)	- (0.000)	-0.003** (0.001)	- (0.000)	-0.001** (0.000)	- (0.000)	-0.006* (0.000)	- (0.000)	-0.013** (0.006)	-0.013** (0.006)	-0.013** (0.006)
N	263	233	269	250	255	208	254	236	234	214	263	205	263	205

Dependent Variable: Public Debt to GDP Ratio												
Asian Countries						African Countries						
Variables	(ICRG)		(TI)		(WGI)		(ICRG)		(TI)		(WGI)	
Instruments	31	27	32	39	32	35	27	27	35	36	33	34
<i>Diagnostic Test</i>												
Hansen J Test	0.861	0.817	0.987	0.933	0.994	0.988	0.841	0.818	0.977	0.995	0.975	0.994
AR(2) Test	0.975	0.472	0.732	0.421	0.907	0.711	0.729	0.623	0.524	0.453	0.121	0.229
t- test of Equality	-	-1.37	-	-1.80*	-	-2.57***	-	-	-	-	-	-

Note: 1) *, ** and *** represents significance at 10%, 5% and 1% respectively. 2) Standard errors in parentheses. 3) Reported results for diagnostic tests are p-values. 4) Instrumented variables are lags (1-3) for *MIL*, lags (1-4) for *DEBT*, lags (1-3) for *INT*, lag (1) for *RGDP*, lags (1-4) for *INF*, lag (1) for *POP* and lag (1-2) for *CORR*. 4) Test of equality for Asia versus Africa is applied on the corruption's coefficient in equations 2, 4 & 6, respectively.

5.3 Region-Specific Marginal Effects

The impact of corruption on public debt based on institutional quality show statistically significantly negative interaction terms in both regions.⁸ To clarify the findings we have computed the marginal effects of corruption at the average value of institutional quality i.e., 0.004 for Asian and 0.638 for African countries. The impact of corruption on public debt tends to decline from 0.004 to 0.003 (0.004-0.001(0.004)) after controlling the institutional quality in Asia whereas the effect declines from 0.022 to 0.018 (0.022-0.006(0.638)) for Africa.⁹ The result suggests that democratic government effectively monitor the corruption and its likely effects on the public debt and this partially offsets the magnifying effect of corruption.

The marginal effect of corruption at country-level institutional quality for Asia are portrayed in Figure 5.1 which identifies the countries with quality institutions have large declining effect of corruption on public debt. Furthermore, the threshold level of institutional quality at which it offsets the positive impact of corruption is calculated at 4.00.¹⁰ The result shows that twelve out of thirty Asian countries are above that threshold including Armenia, Bangladesh, Cyprus, Georgia, India, Lebanon, Malaysia, Nepal, Philippines, Sri Lanka and Turkey. Similarly, when compared with the calculated threshold level of institutional quality in Africa i.e., 3.66, the trend in Figure 5.2 shows that eighteen out of 45 African countries namely Benin, Botswana, Comoros, Ghana, Lesotho, Madagascar, Malawi, Mali, Mauritius, Mozambique, Namibia, Niger, Senegal, Sierra Leone, South Africa and Zambia have polity index above the threshold. This overall indicates that the countries where institutional quality is above threshold level, effect of corruption on public is offset and results in net decline in public debt. This is so because better quality of institutions in democratic government system improves the budgetary position of the country hence reduce public debt.

⁸ The empirical findings for models (with interaction) using TI's measure of corruption are interpreted and discussed in detail, for parsimony.

⁹ $\frac{\partial debt}{\partial corr} = coefficientofCORR + coefficientofinteractionterm * \overline{CORR}$

¹⁰ $\left(- \frac{\partial coefficientofcorr}{\partial coefficientofinteractionterm} \right)$

Figure 5.3: Country-Specific Marginal Effects of Corruption in Asia

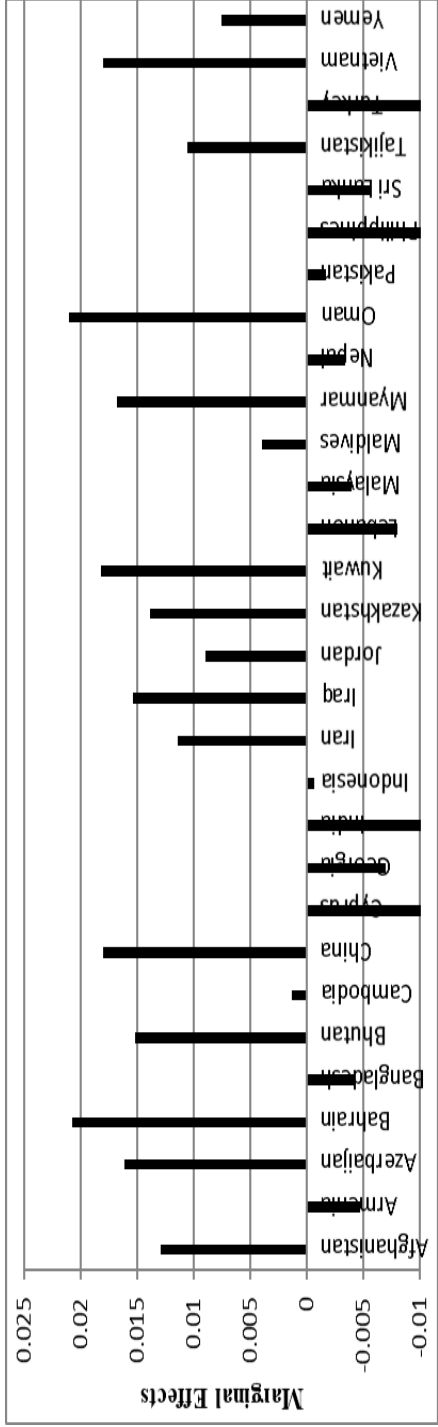
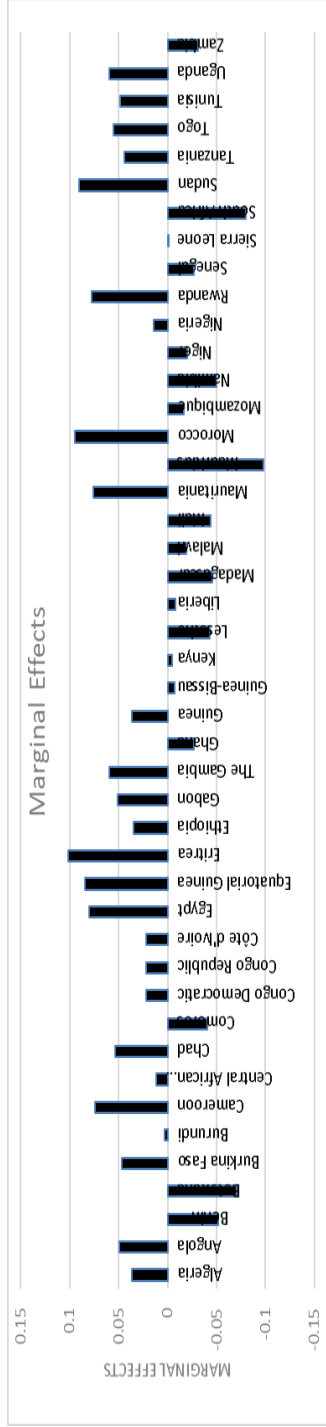


Figure 5.4: Country-Specific Marginal Effects of Corruption in Africa



6. Conclusions and Policy Implications

This study is an attempt to examine the effect of corruption on public debt in Asian and African countries over the time period 1990 to 2016, controlling for the role of institutional quality. The analysis is done first by pooling the data of selected Asian and African countries and introducing intercept and slope dummy for corruption in the model. Secondly, separate models are estimated for Asian and African region for comparative analysis.

The findings show that overall corruption tends to magnify the debt burden in selected Asian and African countries where the effect is found to be sharper in African region than Asian. However, the results suggest that the institutional quality control by the democratic government can reduce the impact of corruption on public debt because of effective government spending and better tax revenue collection management. Moreover, the effect of other control variables on public debt shows that lag of debt has significantly positive effect on public debt. Real GDP growth has negative effect on debt in all equations. The military expenditure appeared as statistically significantly positive and larger in African countries. Furthermore, inflation and interest payment has insignificant coefficient for Asian countries while has a negligible significant and negative effect in African countries. The regional dummy in pooled data shows the public debt in Asian region is more than African region but the effect of corruption on public debt is more acute in African region.

Based on the findings, study recommends that Asian and African countries need to control corruption through effective anti-corruption strategies to reduce public debt burden. An effective anti-corruption strategy requires strong political will, adequate measures of transparency and accountability and strong judicial system that can be supported by the democratic government as proved by the marginal effects at average institutional quality of respective countries. Moreover, the countries must boost the real GDP growth which is helpful in tackling high public debt.

References

Akitoby, B., T. Komatsuzaki, and A. Binder (2014). "Inflation and Public Debt Reversals in the G7 Countries." IMF Working Paper 14/96, International Monetary Fund, Washington, D.C.

Anderson, T. W. and C. Hsiao (1982). "Formulation and Estimation of Dynamic Models using Panel Data." *Journal of Econometrics*, Vol. 18, No.1, pp. 47-82.

Apergis, E., and Apergis, N. (2019). New evidence on Corruption and Government Debt from a Global Country Panel: A Non-linear Panel Long-run Approach. *Journal of Economic Studies*, Vol. 46, No. 5, pp. 1009-1027

Arellano, M. and O. Bover (1995). "Another look at the Instrumental Variable Estimation of Error-Components Models." *Journal of Econometrics*, Vol.68, pp. 29-51.

Arellano, M and S. Bond (1991). "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations." *The Review of Economic Studies*, Vol. 58, No. 2, pp. 277-297.

Bäck, H. and A. Hadenius (2008), "Democracy and State Capacity: Exploring a J-Shaped Relationship", *Governance: An International Journal of Policy, Administration, and Institutions*, Vol. 21, No. 1, pp. 1–24

Ayee, J. R. A. (2002). "Corruption and the Future of the Public Service in Africa." *Law and Politics in Africa, Asia and Latin America*, Vol. 35, No. 1, pp. 6-22.

Barro, R. J. (1974). "Are Government Bonds net Wealth?" *Journal of Political Economy*, Vol. 82, No. 6, pp. 1095-1117.

Benfratello, L. A. D. Monte and L. Pennacchio (2018). "Corruption and Public Debt: A Cross-Country Analysis." *Applied Economics Letters*, Vol. 25, No. 5, pp.340-344.

Bildirici, M. and O. Ersin. (2007). "Domestic Debt Inflation and Economic Crises: A Panel Co-integration Application to Emerging and Developed Economies." *Applied Econometrics and International Development*, Vol.7, No.1, pp 31-47.

Blundell, R and S. Bond (1998). "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models." *Journal of Econometrics*, Vol. 87, pp. 115-143.

Bon, N.V. (2015). "The Relationship between Public Debt and Inflation in Developing Countries: Empirical Evidence Based on Difference Panel GMM." *Asian Journal of Empirical Research*, Vol. 5, No. 9, pp.102-116.

Brown, E. M. (2014). "Corruption and Violence in Africa: A Case Study of Nigeria." Published in *Corruption in Africa A Threat to Justice and Sustainable Peace* by Globethics. net: Geneva, pp.101-144.

Charron, N. and V. Lapuente (2010), "Does Democracy Produce Quality of Government?" *European Journal of Political Research*, Vol. 49, Issue 4, pp. 443–470.

Cooray, A., R. Dzhumashev, and F. Schneider (2016). "How Does Corruption Affect Public Debt? An Empirical Analysis." *World Development*, Vol. 90, No. 2, pp.115–127.

Dellavallade, C. (2006). "Corruption and Distribution of Public Spending in Developing Countries." *Journal of Economic and Finance*, Vol. 30, No. 2, pp. 222-239.

Fernandez, M. G. and C. G. Velasco (2014). "Shadow Economy, Corruption and Public Debt in Spain." *Journal of Policy Modeling*, Vol. 36, No. 9, pp.1101-1117.

Fry, M (1997). *Emancipating the Banking System and Developing Markets for Government Debt*. Published by Routledge: London.

Henri, N. (2018). "Impact of Corruption on Public Debt: Evidence from Sub-Saharan African Countries." *American Journal of Economics*, Vol.8, No.1, pp.14-17.

Jajkowicz, O. and A. Drobiszova (2015). "The Effect of Corruption on Government Expenditure Allocation in OECD Countries." *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, Vol.63, No.4, pp. 1251–1259

Kaufman, D. (2010). "Can Corruption Adversely Affect Public Finances in Industrialized Countries?" Brookings Institution.

Kolstad, I. and A. Wiig (2011), "Does Democracy Reduce Corruption?" CMI Working Paper No. 4.

Krueger, A.O. (1974). "The Political Economy of the Rent-Seeking Society." *The American Economic Review*, Vol. 64, No. 3, pp. 291-303.

Krugman, P. (1988). "Financing Vs. Forgiving a Debt Overhang." *Journal of Development Economics*. Vol. 29, pp. 253-268.

Liu, C and T. T. Moldogaziev (2017). "Corruption and State and Local Government Debt Expansion." *Public Administration Review*, Vol. 77, No. 5, pp. 681–690.

Lumumba, P. P. (2011). "Corruption: The Bane of Africa." Paper presented at SAPICS 33rd Annual Conference and Exhibition, South Africa. 20-22 June 2011 (p. 16)

Masabo, C.J. (2014). "Corruption and Fraudulent Culture: The Case of Tanzania." Published in *Corruption in Africa A Threat to Justice and Sustainable Peace* by Globethics. net: Geneva, pp.145-168.

Mauro, P. (1998). "Corruption and the Composition of Government Expenditure." *Journal of Public Economics*, Vol. 69, No.1, pp. 263–279.

McFerson, H. M. (2009). "Governance and Hyper-Corruption in Resource rich African Countries." *Third World Quarterly*, Vol. 30 No. 8, pp.1529-1547.

Moran, J. (1999). "Patterns of Corruption and Development in East Asia." *Third World Quarterly*, Vol. 20, No. 3, pp. 569-587.

Nickell, S. (1981). "Biases in Dynamic Models with Fixed Effects." *Econometrica*, Vol. 49, No. 6, pp. 1417-1426.

Ogunyemi, A. O. (2011). "Rethinking the Origin of Nigeria's Debt Burden: A Historical Reconstruction." *Journal of the Historical Society of Nigeria*, Vol. 20, pp. 26-44.

Quah, J. S. T. (2003). "Causes and Consequences of Corruption in Southeast Asia: A Comparative Analysis of Indonesia, Philippines and Thailand." *Asian Journal of Public Administration*, Vol. 25, No. 2, pp. 235-266.

Pellegata, A. (2013). "Constraining Political Corruption: An Empirical Analysis of the Impact of Democracy", *Democratization*, Vol. 20, pp. 1195-1218

Robb, G. (1992). *White Collar Crime in Modern England: Financial Fraud and Business Morality 1845–1929*. Cambridge University Press: Cambridge.

Ricardo, D. (1817). *On the Principle of Economy and Taxation*. Published by J. Murray.

Rose-Ackerman, S. (1978). *Corruption: A Study in Political Economy*. Published by Academic Press: London. Pani, M. (2009), "Hold Your Nose and Vote: Why Do Some Democracies Tolerate Corruption?" IMF Working Paper no. 83.

Ross, S. A. (1973). "The Economic Theory of Agency: The Principal's Problem." *The American Economic Review*, Vol. 63, No. 2, pp.134-139.

Saha, S and Campbell, N. (2007), "Studies of the Effect of Democracy on Corruption", presented at the 36th Australian Conference of Economists 'Economics of Corruption Session' Tasmania, Australia, 24-26 September.

Say, J. B. (1880). *A Treatise on Political Economy on the Production, Distribution and Consumption of Wealth*. Claxton, Remsen and Haffelfinger: Philadelphia.

Shleifer, A. and R. W. Vishny (1993). "Corruption." *The Quarterly Journal of Economics*, Vol. 108, No. 3, pp. 599-617.

Singh, C. (1999). "Domestic Debt and Economic Growth in India." *Economic and Political Weekly*, Vol. 34, No. 23, pp. 1445-1453.

Sinha, P., V. Arora, and V. Bansal (2011). “Determinants of Public Debt for middle income and high income group countries using Panel Data regression.” MPRA Paper No. 32079.

Sung, H. (2004), “Democracy and Political Corruption: A Cross-National Comparison”, *Crime, Law and Social Change*, No. 41, pp. 179-194

Swamy, V. (2015). “Government Debt and Its Macroeconomic Determinants- An Empirical Investigation.” Working Paper no 64106, Munich Personal RePEc archive (MPRA).

Tanzi, V., and H. Davoodi. (2002). “*Corruption, Public Investment, and Growth*.” In *Governance, Corruption, and Economic Performance*, edited by. G. T. Abed, and S. Gupta, 280–299. Washington, D.C.: International Monetary Fund, Publication Services.

Thuku, G. K., G. Paul, and O. Almadi (2013). “The Impact of Population Change on Economic Growth in Kenya.” *International Journal of Economics and Management Sciences*, Vol. 2, No. 6, pp. 43-60.

Treisman, D. (2000). “The Causes of Corruption: A Cross-National Study.” *Journal of Public Economics*, Vol. 76, pp. 399–457.

World Economic Outlook. (2018). International Monetary Fund. www.imf.org

Appendix

Table A.1: List of Selected Countries

Asian Countries	
Afghanistan	Jordan
Armenia	Kazakhstan
Azerbaijan	Kuwait
Bahrain	Lebanon
Bangladesh	Malaysia
Bhutan	Myanmar
Cambodia	Nepal
China	Oman
Cyprus	Pakistan
Georgia	Philippines
India	Tajikistan
Indonesia	Turkey
Islamic Republic of Iran	Vietnam
Iraq	Yemen
African Countries	
Algeria	Kenya
Angola	Lesotho
Benin	Liberia
Botswana	Madagascar
Burkina Faso	Malawi
Burundi	Mali
Cameroon	Mauritania
Central African Republic	Mauritius
Chad	Morocco
Comoros	Mozambique
Congo Democratic	Namibia
Congo Republic	Niger
Cote d'Ivoire	Nigeria
Egypt	Rwanda
Equatorial Guinea	Senegal
Eritrea	Sierra Leone
Ethiopia	South Africa
Gabon	Sudan
The Gambia	Tanzania
Ghana	Togo
Guinea	Tunisia
Guinea-Bissau	Uganda
	Zambia

Benchmarking the Intermediation Costs of Islamic and Conventional Banks: Evidence from Indonesia

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ABSTRACT

The number of studies examining the intermediation costs of Islamic banking remains limited. This paper aims to benchmark the intermediation costs of Islamic and conventional banks as measured by net profit or net interest margin. The question to be answered is whether the level of net margin is higher or lower in Islamic than in conventional banking. This paper relies on the system generalized method of moments (GMM) panel regression, in which net margin is treated as a function of “pure spread” determinants, bank-specific variables not formally seen as “pure spread” determinants, and macroeconomic conditions. The sample includes unbalanced panel data from 12 Islamic and 97 conventional banks in Indonesia over 2004-2018. The results indicate no strong evidence that the level of net margin in Islamic banking differs from that in conventional banking. The difference between net margins in the two banking systems is at best not robust. It is subject to the inclusion of different control variables, the composition of the sample, and, most importantly, outliers. Both anecdotal beliefs saying that Islamic banking is more costly and an opposing claim that Islamic banking brings about a promise for lower intermediation costs should not be taken for granted.

ملخص

لا يزال عدد الدراسات التي تتناول تكاليف الوساطة في الصيرفة الإسلامية محدوداً. وتهدف هذه الورقة إلى قياس تكاليف الوساطة للبنوك الإسلامية والتقليدية مقاسة بصافي الربح أو صافي هامش الفائدة.

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والسؤال الذي يجب الإجابة عليه هو ما إذا كان مستوى صافي الهامش أعلى أو أقل في البنوك الإسلامية منه في البنوك التقليدية؟. وتعتمد هذه الورقة على طريقة نظام أسلوب اللحظات المعمم ((GMM، حيث يتم التعامل مع صافي الهامش كدالة لمحددات "بيور سبريد"، والمتغيرات الخاصة بالبنك التي لا يُنظر إليها رسمياً على أنها محدّدات "بيور سبريد"، وظروف الاقتصاد الكلي. وتشمل العينة بيانات لوحة غير متوازنة من 12 مصرفاً إسلامياً و 97 مصرفاً تقليدياً في إندونيسيا خلال فترة 2004-2018. وتشير النتائج إلى عدم وجود دليل قوي على أن مستوى صافي الهامش في البنوك الإسلامية يختلف عن مثيله في البنوك التقليدية. والفرق بين صافي الهوامش في النظامين البنكيين ليس قوياً في أحسن الأحوال. فهو يخضع لإدراج متغيرات تحكم مختلفة، وتكوين العينة، والأهم من ذلك، لاستثناءات. ولا ينبغي أن يعتبر كل من المعتقد الذي مفاده أن الخدمات المصرفية الإسلامية أكثر تكلفة، والادعاء المعارض بأن الخدمات المصرفية الإسلامية تقدم وعداً بتكاليف وساطة أقل على أنهما أمر مسلم به.

ABSTRAITE

Le nombre d'études examinant les coûts d'intermédiation de la banque islamique reste limité. Ce document vise à comparer les coûts d'intermédiation des banques islamiques et conventionnelles, mesurés par le bénéfice net ou la marge d'intérêt nette. La question à laquelle il faut répondre est de savoir si le niveau de la marge nette est plus ou moins élevé dans la banque islamique que dans la banque conventionnelle. Ce document s'appuie sur la régression par panel de la méthode des moments généralisés (GMM), dans laquelle la marge nette est traitée comme une fonction des déterminants du "pure spread", des variables spécifiques aux banques qui ne sont pas formellement considérées comme des déterminants du "pure spread", et des conditions macroéconomiques. L'échantillon comprend des données de panel non équilibrées provenant de 12 banques islamiques et de 97 banques conventionnelles en Indonésie entre 2004 et 2018. Les résultats n'indiquent aucune preuve solide que le niveau de la marge nette dans la banque islamique diffère de celui de la banque conventionnelle. La différence entre les marges nettes des deux systèmes bancaires n'est au mieux pas robuste. Elle est soumise à l'inclusion de différentes variables de contrôle, à la composition de l'échantillon et, surtout, aux valeurs aberrantes. Il ne faut pas tenir pour acquis les croyances anecdotiques selon lesquelles la banque islamique est plus coûteuse, ni l'affirmation opposée selon laquelle la banque islamique promet une baisse des coûts d'intermédiation.

Keywords: Bank; Islamic bank; Net interest margin; Dealership model

JEL Classification: G21; L10

1. Introduction

Net interest margin is naturally of economists' interest. In a way, it reflects banks' profitability (Bennaceur and Goaid 2008; Demirgüç-Kunt, Laeven, and Levine 2004). In another way, it can be seen as a measure of financial intermediation costs (Poghosyan, 2013; Jarmuzek and Lybek, 2020). A higher net interest margin implies higher rates charged for credits, or lower returns for deposits, or both. A higher net interest margin, thus, impedes financial intermediation and, as a consequence, slows down economic growth.

Extensive studies have examined the nature of net interest margin in conventional banking and its driving factors. Ho and Saunders (1981) proposed a theoretical model in which risk-averse banks are faced with uncertainty costs and require margin to compensate for the costs. Within the static micro-model of banking firms, Zarruk and Madura (1992) proposed a different model assuming that banks are subject to the prevailing capital regulation and deposit insurance. Later studies are mostly empirical. These comprise the studies by Maudos and Fernández de Guevara (2004), Valverde and Fernández (2007), Lepetit et al. (2008), and Maudos and Solís, (2009) which cover cross-country data, and the studies conducted by Fungáčová and Poghosyan, (2011), Doyran (2013), Entrop et al. (2015), Amuakwa-Mensah and Marbuah (2015) and Le (2017) which focus on one-single country data. The findings highlight several factors which affect bank margins, ranging from bank-specific to macroeconomic and institutional factors.

The spread of Islamic banking (IFSB, 2018) raises a question as to whether net profit margin –i.e. Islamic banks' ratio equivalent to conventional banks' net interest margin– is of the same nature and driven by the same factors as net interest margin. Besides, it raises a question as to whether the level of net margin in Islamic banking has been empirically higher or lower than that in conventional banking. Popular anecdotal belief tends to say that Islamic banking is more costly (e.g. Kuran 1996). By contrast, there is also an opposing claim that Islamic banking brings about a promise for lower intermediation costs (Chapra, 1982; Siddiqi, 1983).

Economically, Islamic banks have a similar function to the conventional banks (Habib, 2018). They serve as a financial intermediary, which receives deposits, provides financing and offers a variety of other

services. Nonetheless, different from conventional banks, Islamic banks profess to comply with the rules and regulations derived from Islamic principles. These include the prohibition of a predetermined rate of interest, promotion of profit and loss sharing and emphasis on social solidarity (Askari, Iqbal and Mirakhor, 2015; Habib, 2018).

Studies examining net margin in Islamic banking are rare. Important examples include the studies by Bashir (2003), Malim, Ibrahim and Rasid (2017) and Malim and Normalini (2018). Hutapea and Kasri (2010), Sun et al. (2014), Lee and Isa (2017) and Bougatef and Korbi (2018) attempt to investigate the determinants of net margin in Islamic and conventional banking, but none of them make a direct comparison between the level of net margin in these two banking systems. Using bank-level data from Malaysia, Ibrahim and Law (2019) compared the level of net margins in Islamic and conventional banking and reported that it is higher in the former than in the latter.

This paper aims to add to the literature in this context. It directly benchmarks the level of net margin in Islamic and conventional banking. The question to be answered is whether, holding all other factors constant, the level of net margin is higher or lower in Islamic than in conventional banking. This paper makes use of unbalanced bank-level panel data from Indonesia, where an established dual (Islamic and conventional) banking system exists for over two decades. The primary finding suggests no evidence that the level of net margin in Islamic banking differs from that in conventional banking. The difference between net margins in the two banking systems is at best not robust and subject to the inclusion of different control variables, the composition of the sample, and most importantly, outliers.

This paper is important in at least two ways. Firstly, in addition to the work by Ibrahim and Law (2019), this paper is among the first to compare the level of net margin in Islamic and conventional banking. This paper differs from those conducted by Hutapea and Kasri (2010), Sun et al. (2014) and Lee and Isa (2017) in which they focused on investigating the determinants of net margin rather than comparing the level of net margin. This paper also differs from other works (e.g. Beck, Demirgüç-Kunt and Merrouche, 2013; Mobarek and Kalonov, 2014; Yanikkaya, Gümüş and Pabuçcu, 2018) comparing Islamic and conventional banks as it concentrates on the level of net margin instead of business model, performance, or risk-taking. Secondly, this paper expands on the thin

literature examining net margin in Indonesia. Other than the study by Hutapea and Kasri (2010), notable studies on net margin in Indonesia include the works by Trinugroho, Agusman, and Tarazi (2014) and Raharjo et al. (2014). The current paper differs from these studies in that it covers both Islamic and conventional banking, makes a direct comparison between the level of net margin in these two banking systems, and covers a larger sample size.

The following section reviews the current literature and develops a hypothesis. Section three describes the details of the data, variables and methods used in the analysis. Section four summarizes and discusses the empirical results. Finally, section five concludes and presents recommendations.

2. Literature Review

To explain the nature of net margin in Islamic banking and to analyze whether the level of net margin in Islamic is higher or lower than that in conventional banking, it is important to first comprehend the ideas behind Islamic banking. This starts from the highest principle of Islam, the oneness of God (*tawhid*) (Choudhury and Hussain, 2005). Such principle requires Muslims not only to acknowledge God as the creator and the supreme commander of the universe, but also to comply with His divine laws called shariah. The shariah, which is derived from the Quran and the Sunnah (the life and sayings of His messenger), covers all aspects of human life, including economic matters. Based on the shariah Muslims justify the prohibition of interest, promotion of profit and loss sharing and emphasis on social solidarity.

In Islam, money is a medium of exchange as well as a unit of account. Money is, however, neither a commodity nor a store of value. It does not in itself have value. Money cannot be bought or sold on credit (Ahmad and Hassan, 2006). If, in any case, money has to be exchanged for money, the amount paid on both sides must be equal. Similarly, if the money has to be loaned and (later) returned, the amount loaned and returned must be equal. Otherwise, the additional payment will be considered as *riba* which is unlawful in Islam (Habib, 2018). Thus, earning money from money – as in the case of interest in conventional banking – is against the Islamic principles.

Islam recognizes money as a form of capital, only when the money is treated as an actual capital that is combined with other resources to carry out productive investment activities. The owner of the money is to be compensated only for returns resulting from such productive activities and not simply from the passage of time (Askari, Iqbal and Mirakhor, 2015; Habib, 2018).

Instead of the creditor-debtor relationship, the operation of Islamic banks is based on profit and loss sharing contracts. The model that can best represent this idea is the two-tier *mudarabah* model (Askari, Iqbal and Mirakhor, 2015). In this model, the operation of an Islamic bank involves three parties, i.e. the surplus economic actors as an ultimate financier, the bank as a financial intermediary and the actors in deficit that ultimately require funds. *Mudarabah* is a special form of partnership where a party acts as a financier or fund provider and the other party acts as an entrepreneur managing the funds. The bank acts as an entrepreneur when it receives funds from the surplus economic actors and, by the same token, as a financier when it provides the funds to the actors in deficit. In both cases, the contract is based on profit and loss sharing mechanisms. Net-losses from the second tier contract will be passed on to the bank, which will further pass it to the depositors according to the first tier contract. Meanwhile, net-profits from the second tier contract will be shared with the bank and, then, the bank will share it with the depositors according to the agreed proportion in the first-tier contract.

Thus, different from conventional banks, Islamic banks will theoretically perform intermediation on a pass-through basis (Askari, Iqbal and Mirakhor, 2015). The returns on assets –regardless of whether positive or negative– are passed by Islamic banks to investors and depositors, creating an embedded spirit of risk-sharing and solidarity.

To benchmark the level of net margin in Islamic and conventional banking, this paper relies on the dealership model originally pioneered by Ho and Saunders (1981). The model suggests that risk-averse banks are faced with uncertainty costs and that the banks require a positive net margin as the price of their intermediation service. The net margin will always be positive as long as uncertainty costs remain to exist. The margin is therefore called, “pure spread”. The original model predicts that, the higher the degree of banks’ risk-aversion, the larger their required net margin is. Besides, the original model predicts that larger sizes of a transaction, more concentrated market structures, and greater variances of

interest rates are all associated with a larger net margin. However, despite its intuitive appeal, the original model by Ho and Saunders (1981) has been viewed as too restrictive (e.g. Maudos and Fernández de Guevara, 2004; Valverde and Fernandez, 2007; Maudos and Solís, 2009). Rather than restricted to the original version, this paper therefore also uses an extended version of the model, particularly the one by Maudos and Solís (2009). The extended version postulates that the level of net margin is a function of pure spread determinants, bank-specific variables not formally seen as pure spread determinants, and other variables representing macroeconomic conditions.

The use of the bank dealership model in Islamic banking context is justified based on several assumptions. The first is that, similar to their conventional counterparts and despite Islamic principles' emphasis on social solidarity, Islamic banks aim to maximize their expected utility of wealth. The second assumption is that Islamic banks are faced with uncertainty costs that are comparable to the uncertainty costs faced by conventional banks. The third assumption is that Islamic banks are, like conventional banks, risk-averse and require net margin to compensate for the uncertainty costs they face.

Different from net margin in conventional banking which consists of only ex ante elements, net margin in Islamic banking consists of ex ante as well as ex post elements (Hutapea and Kasri, 2010). Islamic banks receive deposits in the forms of current accounts, saving accounts and investment accounts. Current accounts are treated by Islamic banks just in the same way as they are treated by conventional banks. Saving accounts allow Islamic banks to use the money with a full amount guarantee. For that reason, many Islamic banks offer different kinds of rewards to the depositors even though they are not obliged to do so. Investment accounts allow Islamic banks to use the money without any guarantee. The banks, however, are obliged to share the profits they earn to the depositors based on a certain formula. Since the value of the profits depends on the business of the banks, the exact rates of profit and loss sharing paid to depositors are only known ex post. On the financing side, Islamic banks may use debt-like instruments such as *murabahah* (mark-up financing) or *bai-muajjal* (the sale of goods and services on a deferred payment basis), profit and loss sharing instruments such as *mudarabah* (profit and loss sharing partnership) or *musharakah* (joint venture), and other instruments such as *ijarah* (renting contract). The stream of income from debt-like instruments is known ex ante. By contrast, the stream of income from

profit and loss sharing instruments depends on the business of banks' clients. It is only known ex post.

Theoretically, the presence of ex post elements can increase uncertainty costs. Banks are now faced with not only the asymmetric arrival of deposit supplies and financing demands, but also the undefined stream of income from profit and loss sharing instruments. This may increase the level of net margin that is required by banks to compensate for their costs. Thus, taking other things constant, the level of net margin in Islamic banking is likely higher than that in conventional banking.

By contrast, the spirit of risk sharing and solidarity may help reduce the net margin in Islamic banking. It may even push down the margin to a lower level than the net interest margin in conventional banking. Faced with higher uncertainty costs, Islamic banks have an option to simply pass through the costs to investors and depositors. This may relieve them from the uncertainty cost pressure and maintain net margin in Islamic banking at a lower level.

However, findings from previous studies have indicated that Islamic banks' depositors are guided by economic motives (Haron and Ahmad 2000). Lower rates of profit and loss sharing paid to depositors are associated with lower levels of deposits. Thus, in spite of the option to pass through the costs, Islamic banks are constrained by the market and forced to continuously pay competitive rates of profit and loss sharing to depositors (Hutapea and Kasri, 2010). Islamic banks are, thus, remain exposed to higher uncertainty costs, and as a consequence, the level of net margin in Islamic banking may not be as low as it is expected.

3. Data and Methodology

In line with the previous works employing the model by Ho and Saunders (1981), and more particularly with the study by Maudos and Solís (2009), this paper uses a regression equation of the type

$$Y_{i,t} = \beta_0 Y_{i,t-1} + \beta_1 I_i + \sum_{j=1}^J \beta^j S_{i,t}^j + \sum_{k=1}^K \beta^k B_{i,t}^k + \sum_{l=1}^L \beta^l M_t^k + \sum_{q=1}^Q \beta^q D_t^q + \varepsilon_{i,t} \quad (1)$$

where Y denotes the dependent variable and I denotes the key independent variable of interest. The alphabet S denotes a vector of bank-

specific control variables that are formally seen as pure-spread determinants, B denotes a vector of bank-specific control variables that are not formally seen as pure-spread determinants, M denotes a vector of macroeconomic control variables, D denotes a vector of dummy control variables and ε denotes the error term. Subscripts i and t refer correspondingly to bank i at time t , while superscripts j , k , l and q refer respectively to variables j -th, k -th, l -th and q -th in each of the aforementioned vectors.

The dependent variable in equation (1) refers to net profit margin in Islamic banking or net interest margin in conventional banking. The net profit margin was calculated as the ratio to average productive assets of the difference between income obtained from financing activities and the profit shared to deposit holders. Similarly, net interest margin was calculated as the ratio to average productive assets of the difference between interest income and interest expense.

The key independent variable of interest is a dummy variable for Islamic banks. This dummy is valued 1 if a bank is an Islamic bank and 0 otherwise. The vector of bank-specific control variables that are formally seen as pure spread determinants comprises the degree of risk aversion, average operating costs, transaction size, credit risk, and non-interest income. The degree of risk aversion was proxied using the ratio of equity to total assets. Bank average operating costs were proxied using the ratio to total assets of operating expenses. These expenses included interest expenses as well as non-interest expenses such as personnel, administrative and other operating expenses. Transaction size is proxied using the logarithm of the loans or financing amount granted. Credit risk was proxied using the ratio of loan loss provisions over loans. Non-interest income was calculated as the ratio of non-interest income to total operating income.

Besides, the vector of bank-specific control variables that are formally seen as pure spread determinants includes the Lerner index of market power. This index, whose values range from 0 (perfect competition) to 1 (monopoly), represents each bank's capacity to set prices, P_i , above its marginal cost, MC_i . The index takes the formula of the form, $Lerner_i = \frac{P_i - MC_i}{P_i}$ (De Guevara, Maudos and Pérez, 2005).

The vector of bank-specific control variables that are not formally seen as pure spread determinants consists of implicit interest payments, opportunity cost of holding reserves, a proxy for management quality and a proxy for financing specialization. Implicit interest payment was calculated as the difference between operating expenses and non-interest income in terms of total assets. The opportunity cost of holding reserves was calculated as the ratio to total assets of cash assets. The proxy for management quality is the cost to gross income ratio, while the proxy for financing specialization is the ratio to total assets of the loans or financing.

The vector of macroeconomic control variables consists of real gross domestic product (GDP) growth and inflation. Real GDP growth refers to the percentage change of the annual real GDP, while inflation refers to the percentage change of the annual consumer price index (CPI).

The vector of dummy control variables consists of a dummy for banks owned by domestic private entities, a dummy for banks owned by the central government, and a dummy for foreign banks. Banks owned by provincial governments were treated as the base, particularly due to their collinearity with bank-specific variables. Besides, the vector of dummy control variables included two other dummies, i.e. a dummy for the 2008 global financial crisis and another dummy for the post-2008 global financial crisis.

Table 1: Description of variables

Variables	Description
DEPENDENT VARIABLES	
Net profit margin	Ratio to average productive assets of the difference between income from financing activities and profit shared to deposit holders (NM)
Net interest margin	Ratio to average productive assets of the difference between interest income and interest expense (NM)
KEY VARIABLE OF INTEREST	
D. Islamic banks	1 if a bank is an Islamic bank; 0 otherwise (DISL)
CONTROL VARIABLES	
Pure spread determinants	
Degree of risk aversion	Ratio of equity to total assets (EQTA)
Average operating costs	Ratio to total assets of operating expenses (OETA)
Transaction size	Logarithm of the loans or financing amount granted (LFIN)
Loan loss provisions	Ratio of loan loss provisions over loans (LLP)
Non-interest income	Ratio of non-interest income to total operating income (NNII)
Market power	Difference between revenues and costs divided by revenues (MPI)
Other bank-specific variables	
Implicit interest	Differences between operating expenses and non-interest income in terms of total assets (IIP)
Opport. cost of holding reserves	Ratio to total assets of liquid reserves (i.e. cash assets) (OCHR)
Management quality	Cost-to-gross-income ratio (MANQ)
Financing specialization	Ratio to total assets of loans or financing (FSPE)
Macroeconomic variables	
Real GDP growth	Percentage change of real gross domestic product (GGDP)
Inflation	Percentage change of consumer price index (INFL)
Dummy variables	
D. central-govern't-owned bank	1 if a bank is owned by central government; 0 otherwise (DGO)
D. domestic private-owned bank	1 if a bank is owned by domestic private entity; 0 otherwise (DDP)
D. foreign bank	1 if a bank is subsidiary of a foreign entity; 0 otherwise (DFO)
D. 2008 global financial crisis	1 if a year is 2008; 0 otherwise (DGFC)
D. post-2008 global fin. Crisis	1 if a year is later than 2008; 0 otherwise (DPFC)

Data for bank-specific control variables were taken from each bank's published end of year financial reports. In cases where such reports were not available for a particular year, comparable data provided by the Indonesian banking services authority were used. Meanwhile, the rest of the data were obtained from Statistics Indonesia.

The full panel dataset was unbalanced. It extended over 15 years, from 2004 to 2018, and consisted of 12 Islamic and 97 conventional banks. The banks included in the sample were banks that remained to exist until 2018, experienced no recent merger or recent conversion from conventional to Islamic, and had at least three years of observations.

Different from macroeconomic control variables and dummies that are strictly exogenous, bank-specific control variables are assumed to be weakly exogenous to the net margin. Their past and current values are uncorrelated with the error terms, but their future values are. Including these variables and a lag of the dependent variable on the right-hand side of the equation (1) may cause fixed effect estimators inconsistent (Nickell, 1981). To avoid such problem, the system generalized method of moments (GMM) estimators (Arellano and Bover, 1995; Blundell and Bond, 2000) were used. These estimators apply variables in lagged levels as instruments for differenced equations and variables in lagged differences as instruments for level equations.

The use of the system GMM estimators is only justified if the instruments are not correlated with the residuals and there is no second-order serial correlation in the error terms. To check these assumptions, Hansen tests of overidentification and Arellano-Bond tests for zero autocorrelation were conducted. Non-rejections of the null hypothesis in these tests implied that the assumptions were met.

4. Empirical Results

Table 2 presents the descriptive statistics. The average level of net margin in Islamic is higher than that in conventional banking. The level of net margin in Islamic banking is also more dispersed, in that it has a broader range and a larger standard deviation than the level of net margin in conventional banking. Figure 1 visually shows the distribution of net margin values and indicates the existence of outliers.

Table 3 summarizes the correlation matrix. For the sake of brevity, only the correlation coefficients between the main variables are reported. In general, the coefficients are relatively low, relieving the concerns about multicollinearity.

4.1. Basic Regression Results

Table 4 provides the basic regression results. Regressions 1-4 refer to the original bank dealership model by Ho and Saunders (1981). Regression 1 includes a constant, a lag of the dependent variable, an Islamic bank dummy and five bank-specific control variables that are formally seen as pure-spread determinants. Regression 2 adds three dummies for bank ownership types. In regression 3, two macroeconomic variables and two dummies related to the 2008 global financial crisis replace the three ownership dummies. In regression 4, all of the aforementioned variables are included. To keep the number of instruments below the number of panels (Roodman, 2009), the lag's ranges in these regressions are set to between 1 and 12.

The results indicate that all required assumptions in regressions 1-4 are met. Both Hansen tests of overidentification and Arellano-Bond tests for zero autocorrelation fail to reject the null hypotheses of the over-identifying restrictions and of the absence of the second-order serial autocorrelation in the error terms. The results also indicate that some of the bank-specific control variables that are formally seen as pure spread determinants have a significant effect on net margin. This is in line with the previous findings that average operating costs (Maudos and Fernández de Guevara, 2004; Maudos and Solís, 2009; Entrop *et al.*, 2015), non-interest income (Maudos and Solís, 2009; Entrop *et al.*, 2015) and market power (Maudos and Fernández de Guevara, 2004; Maudos and Solís, 2009; Trinugroho, Agusman and Tarazi, 2014) matter for net margin.

Table 2: Descriptive statistics

	Total sample					Islamic banks					Conventional banks				
	Mean	St. Dev.	Min.	Max.		Mean	St. Dev.	Min.	Max.		Mean	St. Dev.	Min.	Max.	
NM	6.340	3.165	0.240	35.960		7.101	5.462	2.220	35.960		6.281	2.905	0.240	21.840	
EQTA	0.146	0.115	-0.033	2.312		0.141	0.115	0.032	0.801		0.147	0.115	-0.033	2.312	
OETA	0.094	0.054	0.017	0.961		0.108	0.065	0.030	0.489		0.093	0.053	0.017	0.961	
LFIN	15.255	1.964	7.114	20.506		15.567	1.330	11.188	18.028		15.231	2.003	7.114	20.506	
LLP	1.793	2.179	0.000	33.780		2.702	3.909	0.460	29.950		1.722	1.967	0.000	33.780	
NII	0.140	0.165	0.002	0.952		0.131	0.130	0.002	0.765		0.141	0.168	0.003	0.952	
MPI	-0.829	0.833	-7.981	0.568		-0.963	0.827	-4.692	0.471		-0.819	0.833	-7.981	0.568	
IIP	0.075	0.037	-0.078	0.378		0.088	0.050	-0.078	0.324		0.074	0.035	-0.073	0.378	
OCHR	0.018	0.019	0.000	0.134		0.010	0.008	0.000	0.035		0.019	0.020	0.000	0.134	
MANQ	2.756	1.961	0.462	63.993		2.418	0.798	0.525	6.296		2.783	2.022	0.462	63.993	
FSPE	0.603	0.152	0.002	1.063		0.708	0.103	0.109	0.900		0.594	0.152	0.002	1.063	
GGDP	5.476	0.536	4.630	6.350		5.380	0.487	4.630	6.350		5.484	0.539	4.630	6.350	
INFL	6.228	3.647	2.780	17.110		5.441	3.037	2.780	17.110		6.289	3.684	2.780	17.110	

Source: Author Estimation

Table 3: Correlation matrix

	NM	EQTA	OETA	LFIN	LLP	NII	MPI	IIP	OCHR	MAN	FSPE	GGDP	INFL
NM	1.000												
EQTA	0.103	1.000											
OETA	0.141	-0.060	1.000										
LFIN	-0.151	-0.320	-0.047	1.000									
LLP	0.017	0.039	0.184	0.100	1.000								
NII	-0.322	-0.084	0.338	0.245	0.074	1.000							
MPI	0.305	0.035	-0.186	0.223	-0.079	0.354	1.000						
IIP	0.397	0.026	0.448	-0.225	0.200	-0.500	-0.564	1.000					
OCHR	0.540	-0.112	-0.029	-0.039	-0.014	-0.292	0.214	0.177	1.000				
MANQ	-0.117	-0.065	-0.205	-0.011	-0.009	-0.134	-0.031	-0.136	-0.075	1.000			
FSPE	0.043	-0.048	0.030	0.349	0.078	-0.173	-0.068	0.224	-0.081	0.001	1.000		
GGDP	0.055	-0.043	-0.081	-0.141	-0.021	-0.035	0.066	-0.063	0.085	0.079	-0.093	1.000	
INFL	0.125	-0.070	-0.080	-0.232	0.015	-0.124	0.037	0.007	0.106	0.055	-0.116	0.338	1.000

Source: Author Estimation

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Table 4: Basic regression results

	System GMM Estimators							
	Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5	Reg. 6	Reg. 7	Reg. 8
L.NM	0.488*** (0.082)	0.478*** (0.076)	0.503*** (0.082)	0.502*** (0.074)	0.410*** (0.058)	0.416*** (0.061)	0.413*** (0.061)	0.426*** (0.064)
DISL	0.485 (0.391)	0.691 (0.417)	0.480 (0.387)	0.603 (0.379)	0.722* (0.419)	0.786* (0.447)	0.678* (0.407)	0.713* (0.411)
EQTA	-0.280 (1.229)	-0.485 (1.209)	-0.195 (1.130)	-0.346 (1.080)	-0.592 (1.139)	-0.702 (1.067)	-0.405 (0.934)	-0.579 (0.860)
OETA	7.622*** (2.680)	7.836*** (2.779)	7.033*** (2.476)	7.222*** (2.531)	1.182 (0.772)	1.377* (0.750)	0.848 (0.742)	1.069 (0.714)
LFIN	-0.276** (0.107)	- (0.108)	-0.204 (0.123)	-0.223* (0.120)	- (0.142)	- (0.146)	-0.331** (0.139)	-0.310** (0.133)
LLP	-0.014 (0.067)	-0.016 (0.068)	-0.019 (0.065)	-0.022 (0.066)	-0.095 (0.074)	-0.097 (0.075)	-0.102 (0.069)	-0.106 (0.069)
NNII	- (0.704)	- (0.744)	- (0.704)	- (0.750)	- (0.714)	- (0.763)	- (0.669)	- (0.719)
MPI	5.423*** (0.704)	4.784*** (0.744)	5.202*** (0.704)	4.554*** (0.750)	2.160*** (0.714)	2.083*** (0.763)	2.134*** (0.669)	2.070*** (0.719)
IIP	1.197*** (0.168)	1.216*** (0.168)	1.184*** (0.171)	1.210*** (0.172)	1.365*** (0.202)	1.401*** (0.201)	1.309*** (0.192)	1.355*** (0.197)
OCHR					21.729** (3.485)	22.136** (3.346)	20.360** (3.819)	21.009** (3.699)
MANQ					23.433** (8.658)	27.866** (8.968)	26.518** (8.679)	32.144** (8.548)
FSPE					-0.021 (0.023)	-0.017 (0.021)	-0.015 (0.017)	-0.012 (0.016)
GGDP			-0.150* (0.076)	-0.156** (0.075)			-0.110 (0.070)	-0.123* (0.073)
INFL			-0.007 (0.016)	-0.006 (0.016)			-0.014 (0.013)	-0.015 (0.013)
Ds. own Ds. crisis		Yes	Yes	Yes		Yes	Yes	Yes
N obs	1,494	1,494	1,494	1,494	1,494	1,494	1,494	1,494
N banks	109	109	109	109	109	109	109	109
N inst	93	96	97	100	90	93	94	97
2nd order test	0.611	0.577	0.582	0.552	0.896	0.856	0.805	0.740
Hansen test	0.157	0.164	0.151	0.162	0.123	0.103	0.188	0.164

Note: Each regression includes a constant. The lag's ranges in regressions 1-4 are set to between 1 and 12, while in regressions 5-8 are set to between 1 and 7. The values in parentheses are heteroscedasticity robust standard errors clustered at bank level. The values reported for 2nd order test and Hansen test refer to the prob. > z and prob. > chi2 respectively. The asterisk *, ** and *** denote significance at the 10, 5 or 1 percent level.

More importantly, with respect to the focus in this paper, it can be seen that the effect of Islamic bank dummy in regressions 1-4 is always positive, but not statistically significant. There is here no evidence indicating the presence of a statistical difference between the level of net margin in Islamic and conventional banking.

Regressions 5-8 refer to the extended bank dealership model. Regression 5 includes a constant, a lag of the dependent variable, an Islamic bank dummy, bank-specific control variables that are formally seen as pure-spread determinants as well as variables that are not formally seen as pure spread determinants. Regression 6 adds three dummies for bank ownership types. In regression 7, two macroeconomic variables and two dummies related to the 2008 global financial crisis are included instead of ownership dummies. Regression 8 includes all of the variables just mentioned. To prevent the proliferation of the number of instruments, the lag's ranges are set to between 1 and 7.

The results indicate that all required assumptions in regressions 5-8 are met. There is no correlation between the instruments and the residuals. Additionally, there is no second-order serial correlation in the error terms. In line with the findings in previous literature, the results also indicate that implicit interest payments (Maudos and Solís, 2009; Poghosyan, 2010; Lee and Isa, 2017) and opportunity cost of holding reserves (Zhou and Wong, 2008; Islam and Nishiyama, 2016) have a significant effect on net margin.

The coefficient of the dummy for Islamic banks is positive and statistically significant in regressions 5-8 albeit only at the 10 percent level. There is here some weak evidence that the level of net margin is higher in Islamic than in conventional banking.

4.2. Further Results

Regressions in Table 4 include 109 banks of which asset size varies quite widely. The fact that no Islamic bank belongs to the top 10 largest banks may raise a concern that the results in Table 4 are biased. To check if the presence of the top 10 largest conventional banks in the sample biases the results, regressions in Table 4 are repeated while excluding those 10 banks.

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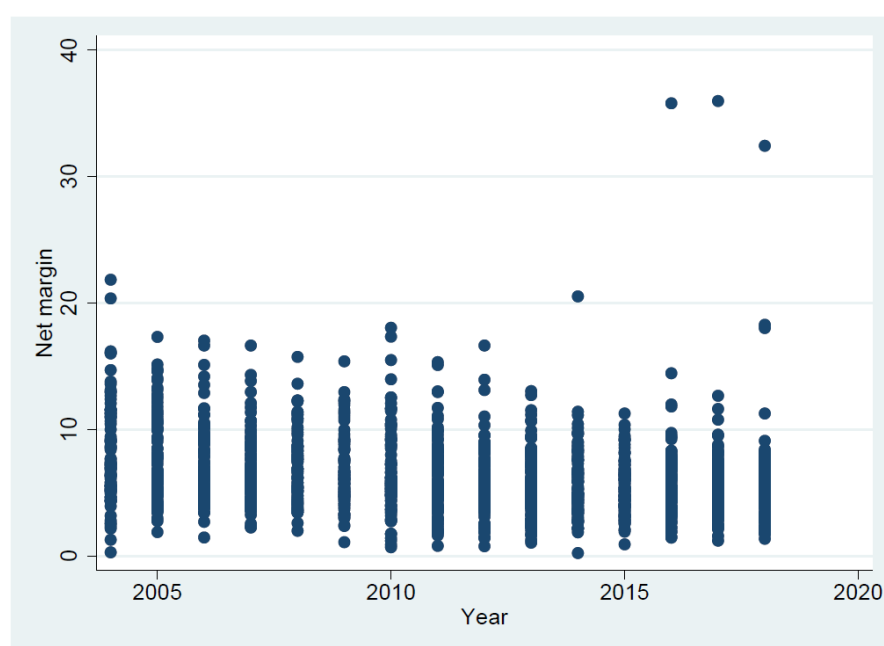
Table 5: Results with the sample excluding ten largest banks

	Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5	Reg. 6	Reg. 7	Reg. 8
L.NM	0.480*** (0.084)	0.477*** (0.076)	0.492*** (0.085)	0.493*** (0.077)	0.409*** (0.059)	0.413*** (0.062)	0.419*** (0.063)	0.427*** (0.067)
DISL	0.535 (0.409)	0.717 (0.440)	0.510 (0.393)	0.653 (0.399)	0.873* (0.461)	0.899* (0.489)	0.786* (0.419)	0.792* (0.449)
EQTA	-0.333 (1.202)	-0.517 (1.158)	-0.368 (1.131)	-0.468 (1.070)	-0.552 (1.158)	-0.713 (1.083)	-0.586 (0.996)	-0.699 (0.933)
OETA	7.890*** (2.814)	7.940*** (2.781)	7.496*** (2.709)	7.455*** (2.636)	1.275 (0.791)	1.403* (0.780)	0.959 (0.767)	1.114 (0.742)
LFIN	- 0.297*** (0.112)	- 0.312*** (0.113)	-0.291** (0.141)	-0.274** (0.135)	- 0.467*** (0.158)	-0.414** (0.158)	-0.430** (0.164)	-0.343** (0.144)
LLP	-0.019 (0.069)	-0.017 (0.069)	-0.025 (0.066)	-0.024 (0.068)	-0.097 (0.077)	-0.096 (0.075)	-0.102 (0.072)	-0.102 (0.072)
NNII	- 5.554*** (0.783)	- 4.920*** (0.799)	- 5.409*** (0.810)	- 4.747*** (0.819)	- 2.138*** (0.799)	-2.156** (0.830)	- 2.043*** (0.746)	- 2.100*** (0.766)
MPI	1.170*** (0.165)	1.201*** (0.168)	1.164*** (0.168)	1.198*** (0.171)	1.344*** (0.197)	1.379*** (0.202)	1.307*** (0.194)	1.352*** (0.205)
IIP					21.758** * (3.494)	21.881** * (3.392)	20.760** * (3.796)	20.830** * (3.753)
OCHR					23.262** * (9.209)	28.225** * (8.923)	24.431** * (9.472)	31.528** * (8.829)
MANQ					-0.017 (0.020)	-0.016 (0.020)	-0.012 (0.016)	-0.011 (0.016)
FSPE					1.374** (0.680)	1.011 (0.647)	1.472** (0.648)	1.045 (0.630)
GGDP			-0.159* (0.085)	-0.166* (0.084)			-0.129 (0.082)	-0.133 (0.084)
INFL			-0.005 (0.017)	-0.004 (0.017)			-0.014 (0.014)	-0.013 (0.014)
Ds. own		Yes		Yes		Yes		Yes
Ds. crisis			Yes	Yes			Yes	Yes
N obs	1,363	1,363	1,363	1,363	1,363	1,363	1,363	1,363
N banks	99	99	99	99	99	99	99	99
N inst	86	88	90	92	90	92	94	96
2nd ord test	0.605	0.571	0.585	0.552	0.882	0.854	0.820	0.764
Hansen test	0.156	0.165	0.139	0.135	0.182	0.189	0.254	0.238

Note: Each regression includes a constant. The lag's ranges in regressions 1-4 are set to between 1 and 11, while in regressions 5-8 are set to between 1 and 7. The values in parentheses are heteroscedasticity robust standard errors clustered at bank level. The values reported for 2nd order test and Hansen test refer to the prob. > z and prob. > chi2 respectively. The asterisk *, ** and *** denote significance at the 10, 5 or 1 percent level.

The results are reported in Table 5. From regression 1 to regression 8, the coefficient of the dummy for Islamic banks is always positive. It is not statistically significant in regressions 1-4, but significant at the 10 percent level in regressions 5-8.

Figure 1: Net margin over the period of analysis



Source: Authors' computation

The scatter plot in Figure 1 visually shows the existence of upper outliers in the value of net margin. This may affect the estimates of regression parameters. To ensure that the conclusions in this paper are not driven by outliers, another robustness test was conducted by excluding observations that were above the 99th percentiles. The number of observations is now reduced to 1,347 and the number of panels is reduced to 98 (an Islamic bank is dropped due to missing values).

Table 6 presents the results. From regression 1 to regression 8, the coefficient of the dummy for Islamic banks stays positive, but not statistically significant. Excluding outliers does weaken the relationship between Islamic bank dummy and net margin.

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Table 6: Results with the sample excluding ten largest banks and outliers

	System GMM Estimators							
	Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5	Reg. 6	Reg. 7	Reg. 8
L.NM	0.469*** (0.070)	0.480*** (0.056)	0.485*** (0.071)	0.495*** (0.056)	0.436*** (0.053)	0.419*** (0.057)	0.449*** (0.054)	0.433*** (0.058)
DISL	0.225 (0.260)	0.377 (0.268)	0.188 (0.261)	0.325 (0.249)	0.295 (0.287)	0.462 (0.315)	0.251 (0.267)	0.405 (0.298)
EQTA	0.037 (0.467)	-0.126 (0.434)	-0.007 (0.451)	-0.064 (0.420)	-0.141 (0.486)	-0.199 (0.478)	-0.188 (0.454)	-0.243 (0.428)
OETA	7.476*** (2.629)	7.539*** (2.648)	7.073*** (2.486)	7.085*** (2.511)	1.702** (0.851)	1.754** (0.850)	1.466* (0.812)	1.574* (0.795)
LFIN	- 0.338*** (0.088)	- 0.345*** (0.078)	- 0.325*** (0.099)	- 0.300*** (0.092)	- 0.488*** (0.095)	- 0.511*** (0.103)	- 0.507*** (0.125)	- 0.498*** (0.123)
LLP	0.009 (0.055)	0.012 (0.056)	0.002 (0.053)	0.005 (0.054)	-0.065 (0.065)	-0.058 (0.066)	-0.067 (0.067)	-0.062 (0.067)
NNII	- 4.787*** (0.705)	- 4.137*** (0.683)	- 4.607*** (0.700)	- 3.919*** (0.681)	- 1.723*** (0.595)	-1.457** (0.687)	- 1.689*** (0.625)	-1.414** (0.662)
MPI	1.093*** (0.136)	1.134*** (0.135)	1.094*** (0.137)	1.136*** (0.139)	1.277*** (0.175)	1.286*** (0.172)	1.263*** (0.176)	1.275*** (0.173)
IIP					18.579** * (4.187)	18.669** * (4.220)	17.894** * (4.482)	17.823** * (4.507)
OCHR					16.377* (9.079)	14.340* (8.193)	14.548* (7.987)	14.696* (7.746)
MANQ					-0.021 (0.021)	-0.021 (0.022)	-0.017 (0.019)	-0.016 (0.018)
FSPE					1.727*** (0.544)	1.627*** (0.511)	1.962*** (0.577)	1.711*** (0.545)
GGDP			-0.145* (0.083)	-0.145* (0.081)			-0.113 (0.081)	-0.113 (0.084)
INFL			-0.001 (0.012)	-0.000 (0.012)			-0.011 (0.011)	-0.009 (0.011)
Ds. own		Yes		Yes		Yes		Yes
Ds. crisis			Yes	Yes			Yes	Yes
N obs	1,347	1,347	1,347	1,347	1,347	1,347	1,347	1,347
N banks	98	98	98	98	98	98	98	98
N inst	86	88	90	92	90	92	94	96
2nd ord test	0.194	0.179	0.167	0.154	0.488	0.427	0.469	0.415
Hansen test	0.191	0.205	0.167	0.184	0.263	0.222	0.280	0.249

Note: Each regression includes a constant. The lag's ranges in regressions 1-4 are set to between 1 and 11, while in regressions 5-8 are set to between 1 and 7. The values in parentheses are heteroscedasticity robust standard errors clustered at bank level. The values reported for 2nd order test and Hansen test refer to the prob. > z and prob. > chi2 respectively. The asterisk *, ** and *** denote significance at the 10, 5 or 1 percent level.

Table 7: Results with the sample excluding ten largest banks, outliers, and insignificant bank specific variables

	System GMM Estimators							
	Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5	Reg. 6	Reg. 7	Reg. 8
L.NM	0.455** * (0.055)	0.480** * (0.047)	0.478** * (0.058)	0.500** * (0.048)	0.438** * (0.045)	0.423** * (0.048)	0.448** * (0.046)	0.433** * (0.048)
DISL	0.214 (0.287)	0.356 (0.268)	0.222 (0.276)	0.308 (0.249)	0.205 (0.268)	0.291 (0.307)	0.191 (0.259)	0.331 (0.276)
OETA	7.352** * (2.558)	7.449** * (2.462)	6.894** * (2.408)	7.057** * (2.373)	2.341** (1.091)	2.425** (1.125)	1.963* (1.010)	2.105** (1.015)
LFIN	- 0.379** * (0.076)	- 0.353** * (0.072)	- 0.378** * (0.098)	- 0.331** * (0.094)	- 0.502** * (0.094)	- 0.516** * (0.102)	- 0.511** * (0.131)	- 0.494** * (0.132)
NNII	- 4.255** * (0.793)	- 3.697** * (0.793)	- 4.144** * (0.755)	- 3.601** * (0.780)	- 1.989** * (0.723)	-1.709** * (0.741)	-1.850** * (0.714)	-1.506** * (0.718)
MPI	1.045** * (0.140)	1.105** * (0.136)	1.054** * (0.136)	1.121** * (0.138)	1.274** * (0.176)	1.285** * (0.174)	1.242** * (0.185)	1.255** * (0.184)
IIP					16.511* ** (5.309)	16.266* ** (5.247)	15.371* ** (5.419)	15.037* ** (5.258)
OCHR					16.377* * (6.871)	15.205* ** (5.765)	14.574* * (7.049)	14.547* * (5.990)
FSPE					1.621** * (0.559)	1.420** * (0.561)	1.714** * (0.576)	1.361** * (0.550)
GGDP			-0.170** (0.079)	-0.168** (0.073)			-0.121 (0.078)	-0.123 (0.076)
INFL			-0.003 (0.011)	-0.002 (0.012)			-0.005 (0.010)	-0.003 (0.010)
Ds. own		Yes		Yes		Yes		Yes
Ds. crisis			Yes	Yes			Yes	Yes
N obs	1,347	1,347	1,347	1,347	1,347	1,347	1,347	1,347
N banks	98	98	98	98	98	98	98	98
N inst	80	82	84	86	82	84	86	88
2nd order test	0.184	0.179	0.160	0.154	0.439	0.383	0.393	0.330
Hansen test	0.109	0.108	0.149	0.149	0.140	0.127	0.129	0.128

Note: Each regression includes a constant. The lag's ranges in regressions 1-4 are set to between 1 and 15, while in regressions 5-8 are set to between 1 and 9. The values in parentheses are heteroscedasticity robust standard errors clustered at bank level. The values reported for 2nd order test and Hansen test refer to the prob. > z and prob. > chi2 respectively. The asterisk *, ** and *** denote significance at the 10, 5 or 1 percent level.

Regressions in the previous Tables include many independent variables. This may reduce efficiency, particularly when the independent variables included are not relevant to the net margin. To avoid the problem, a final robustness test is conducted by excluding bank-specific control variables whose coefficient turns out to be insignificant in previous regressions.

The results in Table 7 show that the regression model is in general robust. Excluding degree of risk aversion, loan loss provisions, and management quality leads to no substantive change from the results in Table 6. The coefficients of bank specific variables are, in most regressions, significant. By contrast, none of the coefficient of Islamic bank dummy that turns out to be significant.

5. Conclusion

This paper benchmarks the level of net margin in Islamic and conventional banking. Despite the theoretical suggestion that a difference may exist, the results provide no evidence that the level of net margin in Islamic banking differs from that in conventional banking. The difference between net margin in Islamic and conventional banking is at best not robust and subject to the choice of control variables and the composition of the sample. Most importantly, the difference vanishes once the outliers are removed.

Three implications may be derived from these findings. First, these findings dismiss the anecdotal belief that Islamic banking is more costly. Undefined stream of income from profit and loss sharing instruments does not necessarily increase net margin in Islamic banking. There is, thus, no reason to see the spread of Islamic banking as a source of inefficiency in the financial sector. Second, the above findings lend no support to the claim that profit and loss sharing contracts in Islamic banking bring about lower intermediation costs. The fact that Islamic banks has an option to pass through the costs to depositors cannot relieve them from the uncertainty cost pressure. They bear relatively similar cost pressure to conventional banks. Third, those considering Islamic banking should not take the things for granted. More studies are needed to understand the nature of and driving forces behind net margin in this banking system. For example, the results from control variables in this paper indicate that transaction size has a significant effect on net margin. In contrast to the loans amount granted by conventional banks, the amount of financing

granted by Islamic banks remains very small. Thus, policies aimed to increase transaction size in Islamic banking may help reducing intermediation costs in this banking system.

Finally, the results in this paper, which are based on Indonesian data, hint that explaining the overall pattern of net margin in Islamic banking may not be enough. There are observations beyond the general pattern that other observations follow. It is therefore also necessary to elucidate the persistence of outliers and explain why.

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References

Ahmad, A. U. F. and Hassan, M. K. (2006), “The Time Value of Money Concept in Islamic Finance”, *The American Journal of Islamic Social Sciences*. doi: 10.2139/ssrn.3263783.

Amuakwa-Mensah, F. and Marbuah, G. (2015), “The Determinants of Net Interest Margin in the Ghanaian Banking Industry”, *Journal of African Business*, 16(3), pp. 272–288. doi: 10.1080/15228916.2015.1069679.

Arellano, M. and Bover, O. (1995), “Another look at the instrumental variable estimation of error-components models”, *Journal of Econometrics*. doi: 10.1016/0304-4076(94)01642-D.

Askari, H., Iqbal, Z. and Mirakhor, A. (2015), *Introduction to Islamic Economics-Theory and Application*. Singapore: John Wiley & Sons Singapore Pte. Ltd.

Bashir, A.-H. (2003), “Determinants of Profitability in Islamic Banks: Some Evidence From the Middle East”, *Islamic Economic Studies*, 11(1), pp. 32–57.

Beck, T., Demirgüç-Kunt, A. and Merrouche, O. (2013), “Islamic vs. conventional banking: Business model, efficiency and stability”, *Journal of Banking and Finance*, 37(2), pp. 433–447. doi: 10.1016/j.jbankfin.2012.09.016.

Bennaceur, S. and Goaid, M. (2008), “The Determinants of Commercial Bank Interest Margin and Profitability: Evidence from Tunisia Samy Bennaceur 1 Mohamed Goaid 2”, *Frontiers in Finance and Economics*, 5(1), pp. 106–130.

Blundell, R. and Bond, S. (2000), “GMM Estimation with persistent panel data: An application to production functions”, *Econometric Reviews*, 19(3), pp. 321–340. doi: 10.1080/07474930008800475.

Bougatef, K. and Korbi, F. (2018), “The determinants of intermediation margins in Islamic and conventional banks”, *Managerial Finance*, 44(6), pp. 704–721. doi: 10.1108/MF-11-2016-0327.

Chapra, M. U. (1982), "Money and banking in an Islamic economy", in Ariff, M. (ed.) *Monetary and Fiscal Economics of Islam*. Jeddah: International Centre for Research in Islamic Economics.

Choudhury, M. A. and Hussain, M. M. (2005), "A paradigm of Islamic money and banking", *International Journal of Social Economics*, 32(3), pp. 203–217. doi: 10.1108/03068290510580760.

Demirgüç-Kunt, A., Laeven, L. and Levine, R. (2004), "Regulations , Market Structure , Institutions , and the Cost of Financial Intermediation", *Journal of Money, Credit and Banking*, 36(3), pp. 593–622.

Doyran, M. A. (2013), "Net interest margins and firm performance in developing countries: Evidence from Argentine commercial banks", *Management Research Review*, 36(7), pp. 720–742. doi: 10.1108/MRR-05-2012-0100.

Entrop, O. *et al.* (2015), "Determinants of bank interest margins: Impact of maturity transformation", *Journal of Banking and Finance*, 54, pp. 1–19. doi: 10.1016/j.jbankfin.2014.12.001.

Fungáčová, Z. and Poghosyan, T. (2011), "Determinants of bank interest margins in Russia: Does bank ownership matter?", *Economic Systems*, 35(4), pp. 481–495. doi: 10.1016/j.ecosys.2010.11.007.

De Guevara, J. F., Maudos, J. and Pérez, F. (2005), "Market power in European banking sectors", *Journal of Financial Services Research*, 27(2), pp. 109–137. doi: 10.1007/s10693-005-6665-z.

Habib, S. F. (2018), *Fundamentals of Islamic Finance and Banking*. Chichester: John Wiley & Sons.

Haron, S. and Ahmad, N. (2000), "The effects of conventional interest rates and rate of profit on funds deposited with Islamic banking system in Malaysia", *International Journal of Islamic Financial Services*, 1(4), pp. 1–7.

Ho, T. S. Y. and Saunders, A. (1981), "The Determinants of Bank Interest Margins : Theory and Empirical Evidence", *The Journal of Financial and Quantitative Analysis*, 16(4), pp. 581–600. doi: 10.2307/2330377.

Hutapea, E. G. and Kasri, R. A. (2010), “International Journal of Islamic and Middle Eastern Finance and Management”, *International Journal of Islamic and Middle Eastern Finance and Management*, 3(1), pp. 65–82. doi: 10.1108/mf.2008.00934jaa.001.

Ibrahim, M. H. and Law, S. H. (2019), “Financial intermediation costs in a dual banking system: The role of islamic banking”, *Buletin Ekonomi Moneter dan Perbankan*, 22(4), pp. 529–550. doi: 10.21098/bemp.v22i4.1236.

IFSB (2018), *Islamic Financial Services Board Report 2018*.

Islam, M. S. and Nishiyama, S. I. (2016), “The determinants of bank net interest margins: A panel evidence from South Asian countries”, *Research in International Business and Finance*, 37, pp. 501–514. doi: 10.1016/j.ribaf.2016.01.024.

Jarmuzek, M. and Lybek, T. (2020), “Can good governance lower bank intermediation costs?”, *Applied Economics*, 00(00), pp. 1–17. doi: 10.1080/00036846.2019.1697421.

Kuran, T. (1996), “The discontents of Islamic economic morality”, *American Economic Review*, 86(2), pp. 438–442. doi: 10.1057/9780230226203.0037.

Le, T. D. Q. (2017), “The interrelationship between net interest margin and non-interest income: evidence from Vietnam”, *International Journal of Managerial Finance*, 13(5), pp. 521–540. doi: 10.1108/IJMF-06-2017-0110.

Lee, S. P. and Isa, M. (2017), “Determinants of bank margins in a dual banking system”, *Managerial Finance*, 43(6), pp. 630–645. doi: 10.1108/MF-07-2016-0189.

Lepetit, L. *et al.* (2008), “The expansion of services in European banking: Implications for loan pricing and interest margins”, *Journal of Banking and Finance*, 32(11), pp. 2325–2335. doi: 10.1016/j.jbankfin.2007.09.025.

Malim, N. A. K., Ibrahim, M. H. and Rasid, M. E. S. M. (2017), “Explaining intermediation costs of Islamic banks in OIC countries”,

Handbook of Empirical Research on Islam and Economic Life, pp. 395–410. doi: 10.4337/9781784710736.00026.

Malim, N. A. K. and Normalini, M. K. (2018), “Factors Influencing the Margins of Islamic Banks”, *Global Business Review*, 19(4), pp. 1026–1036. doi: 10.1177/0972150918772970.

Maudos, J. and Fernández de Guevara, J. (2004), “Factors explaining the interest margin in the banking sectors of the European Union”, *Journal of Banking and Finance*, 28(9), pp. 2259–2281. doi: 10.1016/j.jbankfin.2003.09.004.

Maudos, J. and Solís, L. (2009), “The determinants of net interest income in the Mexican banking system: An integrated model”, *Journal of Banking and Finance*, 33(10), pp. 1920–1931. doi: 10.1016/j.jbankfin.2009.04.012.

Mobarek, A. and Kalonov, A. (2014), “Comparative performance analysis between conventional and Islamic banks: Empirical evidence from OIC countries”, *Applied Economics*, 46(3), pp. 253–270. doi: 10.1080/00036846.2013.839863.

Nickell, S. (1981), “Biases in dynamic models with fixed effects”, *Econometrica*, 49(6), pp. 1417–1426. doi: 10.1016/0165-1765(88)90046-8.

Poghosyan, T. (2010), “Re-examining the impact of foreign bank participation on interest margins in emerging markets”, *Emerging Markets Review*, 11(4), pp. 390–403. doi: 10.1016/j.ememar.2010.08.003.

Poghosyan, T. (2013), “Financial intermediation costs in low income countries: The role of regulatory, institutional, and macroeconomic factors”, *Economic Systems*, 37(1), pp. 92–110. doi: 10.1016/j.ecosys.2012.07.003.

Raharjo, G. P. *et al.* (2014), “The determinant of commercial banks’ interest margin in Indonesia: An analysis of fixed effect panel regression”, *International Journal of Economics and Financial Issues*, 4(2), pp. 295–308.

Roodman, D. (2009), “How to do xtabond2: An introduction to difference and system GMM in Stata”, *Stata Journal*, 9(1), pp. 86–136. doi: 10.1177/1536867x0900900106.

Siddiqi, M. N. (1983), *Banking without Interest*. Leicester: The Islamic Foundation.

Sun, P. H. *et al.* (2014), “The assets and liabilities gap management of conventional and Islamic banks in the organization of Islamic cooperation (OIC) countries”, *Applied Financial Economics*, 24(5), pp. 333–346. doi: 10.1080/09603107.2013.877568.

Trinugroho, I., Agusman, A. and Tarazi, A. (2014), “Why have bank interest margins been so high in Indonesia since the 1997/1998 financial crisis?”, *Research in International Business and Finance*, 32, pp. 139–158. doi: 10.1016/j.ribaf.2014.04.001.

Valverde, S. C. and Fernandez, F. R. (2007), “The determinants of bank margins in European banking”, *Journal of Banking & Finance*, 31, pp. 2043–2063. doi: 10.1016/j.jbankfin.2006.06.017.

Yanikkaya, H., Gümüş, N. and Pabuçcu, Y. U. (2018), “How profitability differs between conventional and Islamic banks: A dynamic panel data approach”, *Pacific Basin Finance Journal*, 48(January), pp. 99–111. doi: 10.1016/j.pacfin.2018.01.006.

Zarruk, E. R. and Madura, J. (1992), “Optimal Bank Interest Margin under Capital Regulation and Deposit Insurance”, *The Journal of Financial and Quantitative Analysis*, 27(1), p. 143. doi: 10.2307/2331303.

Zhou, K. and Wong, M. C. S. (2008), “The determinants of net interest margins of commercial banks in Mainland China”, *Emerging Markets Finance and Trade*, 44(5), pp. 41–53. doi: 10.2753/REE1540-496X440503.

Thoughts on the Curriculum for Islamic Economics and Finance Program

Ahmet Tıktık

ABSTRACT

Making the teaching of Islamic economics relevant to the challenges faced by the Islamic countries is becoming crucial if the Islamic economics will take its place as a credible area of study field. I provide some suggestions in this regard. The first one is to adopt the newly emerged method of teaching the economy rather than economics as having been done by the CORE Econ group. Relatedly, preparing the students for the job market, the paper also draws the attention to some major tools and concepts. The second one is to orient the Islamic economics and finance program around the Maqasid and thus infusing development perspective into the program. Thirdly, I suggest to expose the students to an historical perspective of "Rise and Fall of Muslim Civilization" that would link the past to the current economic situation of Muslim countries. Lastly, it would be more effective to involve business players from the very beginning to help students in understanding the prevailing concepts in economy.

المخلص

إن ربط تدريس الاقتصاد الإسلامي بالتحديات التي تواجهها البلدان الإسلامية أصبح أمراً بالغ الأهمية إذا كان الاقتصاد الإسلامي سيأخذ مكانه كمجال دراسة موثوق به. وأنا أقدم بعض الاقتراحات في هذا الصدد. أولاً، تبني الطريقة الناشئة حديثاً لتدريس الاقتصاد بدلاً من علوم الاقتصاد كما فعلت مجموعة كور إيكون. وفيما يتعلق بإعداد الطلاب لسوق العمل، تلفت الورقة الانتباه أيضاً إلى بعض الأدوات والمفاهيم الرئيسية. ثانياً، توجيه برنامج الاقتصاد والتمويل الإسلامي حول المقاصد وبالتالي إدخال منظور التنمية في البرنامج. ثالثاً، أقترح تعريف الطلاب بمنظور تاريخي لمسألة "صعود وسقوط الحضارة الإسلامية" الذي من شأنه أن يربط الماضي بالوضع الاقتصادي الحالي للدول الإسلامية. وأخيراً، سيكون إشراك الجهات الفاعلة التجارية من البداية أمراً ذا فعالية أكثر لمساعدة الطلاب فيما يتعلق باستيعاب المفاهيم السائدة في الاقتصاد.

ABSTRAITE

Il devient crucial de rendre l'enseignement de l'économie islamique pertinent par rapport aux défis auxquels sont confrontés les pays islamiques si l'on veut que l'économie islamique prenne sa place en tant que domaine d'étude crédible. Je présente quelques suggestions à cet égard. La première est d'adopter la nouvelle méthode d'enseignement de l'économie plutôt que de l'économie, comme l'a fait le groupe CORE Econ. Dans le cadre de la préparation des étudiants au marché du travail, le document attire également l'attention sur certains outils et concepts majeurs. Le deuxième est d'orienter le programme d'économie et de finance islamiques autour du Maqasid et d'y intégrer ainsi la perspective du développement. Troisièmement, je suggère d'exposer les étudiants à une perspective historique de "Rise and Fall of Muslim Civilization" qui ferait le lien entre le passé et la situation économique actuelle des pays musulmans. Enfin, il serait plus efficace d'impliquer des acteurs du monde des affaires dès le début pour aider les étudiants à comprendre les concepts dominants en économie.

Keywords: Bank; Islamic bank; Net interest margin; Dealership model

JEL Classification: G21; L10

This paper aims to provide some suggestions on the curriculum of Islamic economics and finance (IEF) programs. In doing this, we emphasize two points at the outset. First, our focus will be on the Islamic economics with a view of economic development perspective. There are basically two reasons behind this point. The first reason is stemming from the need to make the IEF curriculum more relevant to job market needs.¹ The second reason pertains to the recent developments taking place in teaching the conventional economics. Though the latter reason has a secondary importance to the IEF curriculum development, it is considered as crucial in shaping the curriculum.

¹ Also, INCEIF (2020) refers to the challenge of disconnect between industry and academia, leaving most graduates ill equipped for jobs in in the real world of Islamic financial institutions. Hidayat et al. (2020) reports on the studies which found in several countries mismatch between skills needed by the industry and skills of IEF graduates obtained during their studies. As a corollary to this finding, Huda et al. (2016) reports that the absorption rate of IEF program graduates in Indonesia stands below 40 %.

Secondly, the points and observations raised in this paper, are thought to be applicable across the IEF education providers globally. A further study which will review the curricula of the current IEF programs would be relevant and complementary to this paper. Not to lose the main focus of the paper, the curricula review is left to a later stage.

The need to make the IEF curriculum relevant to market needs

Students of IEF program, when they graduate, are expected to start working at the following professions:

- Foreign trade companies,
- Finance institutions,
- International institutions,
- NGOs, and
- Governmental agencies, among others.²

In these organizations, the following major functions are performed:

- Country reports/briefs/analyses
- Trade (exports and imports) operations
- Credits (evaluation, allocation, management etc.)
- Foreign investment (portfolio or direct investment)
- Asset management
- Sector policy analysis
- Social policy analysis
- Project preparation/evaluation/execution (management)
- Financial management

The primary objective of the IEF program should be to help students prepare for capabilities to perform these functions depending on the specific career they pursue. Hence one can ask how we should design the

² Certainly, this list is not exhaustive: we can include other professions like academia, entrepreneurial ventures etc. As various studies emphasized (Numan and Ali (2016), Hafsa (2017), and INCEIF (2020) among others), from the supply side perspective, there is also a need to increase qualified academicians in the field of IEF.

IEF program so as to realize the above objective. We suggest that IEF program should have three major components: a) The conventional economics, b) The Islamic economics and finance, c) Orientation and skills formation component.

Conventional Economics

We present two proposals regarding the first component, i.e. the conventional economics. Firstly, conventional economics should be an important component of IEF program: it offers a set of tools and concepts which can be helpful in explaining economic and social developments at country or global level. Therefore, students of IEF program should develop a sound basis of understanding of the conventional economics. Major courses like microeconomics and macroeconomics or specific courses under the first component are expected to strengthen some basic economic concepts and tools in conducting economic and social analyses. We would like to point out that these tools and concepts are crucial in understanding and analyzing economic and social developments in general and delivering the tasks the students will perform in their professional careers. Some of these tools and concepts are the following³

³ This list can be further refined depending on the orientation of a particular IEF program and consultation with the business players in that industry. Moreover, since the paper focuses on the Islamic economics, financial tools and concepts are excluded from the scope.

Tools and concepts	Explanation
Input-output analysis	• Helps connecting expenditures side to value-added and income sides of GDP. • Gives the notion of material balance for every sector • Shows forward and backward linkages among sectors
General equilibrium analysis	• Provides a system-wide view of economy with multisector interdependencies • Gives the notion of resource and budget constraint • Emphasizes the importance of relative prices in determining the resource allocation in an economy
Cost-benefit analysis (project preparation/project evaluation)	• Enables students to gauge the technical feasibility (profitability) of individual investment projects as well to compare alternative investments
Accounting (macro, public sector and corporate)	• Especially national accounting provides a complete and consistent picture of a circular flow in an economy where GDP, current account, budget deficit, and balance sheet of central bank are consistently related
Market/Sector analysis (industrial organization)	• Market assessment tools enables students to analyze and understand the competitive dynamics of an industry (demand and supply, degree of competition, future prospects, emerging technologies, etc.)
Randomized Control Trial analysis	• This is an emerging research tool being used especially in development economics for testing effectiveness of policy implementation on health, education, micro-finance etc. (Muller et al.(2019)

Secondly, nowadays there is a new thinking in teaching the conventional economics. This new approach is heavily influenced by the global financial crisis in 2008, which the prevailing economic theory could not predict, as reflected in a famous question posed by the Queen of England “Why did nobody see this coming?”⁴ To respond to the dissatisfaction with the current teaching, a new approach has been adopted by the CORE-ECON group, which produces open-access teaching material on economics and presently taught at more than 300 universities around the world.⁵

Just to show the difference with the standard textbook we would like to give two excerpts from the textbook “The Economy: Economics for a Changing World” (2017) (<https://core-econ.org/the-economy/>):

“Because CORE starts with big problems and questions from history and current affairs, the models and explanations we use need to take account of real-world phenomena. For example, actors never have complete information about everything relevant to the decisions they are making, motives other than self-interest are also important, and the exercise of power in strategic behaviour often has to be part of the explanation for the outcome we see.” (Preface, p. xv)

“The text focuses throughout on evidence on the economy, from around the world, and from history. It is motivated by questions—how can we explain what we see? The method is to ask interesting questions first and then to introduce models that help to answer them. Standard tools such as constrained optimization are taught by showing how they give insight into real-world problems. Economics as a discipline is set in a social, political, and ethical context in which institutions matter.” (A note to instructors, p. xvii)

Unlike the standard textbook of introductory economics, the newly developed approach (as it is continuously being developed in an open-source material) provides a new way of understanding how the economy works and a new way of explaining the economy to the students.

⁴ Giles (2008)

⁵ The CORE Project stands for “The Curriculum Open-Access Resources in Economics Project”. See The CORE Project: Economics for a Changing World, <https://www.core-econ.org/>

Moreover, concepts, tools and models are introduced from a historical perspective.

Additionally, The Economist (2017) summarizes the new textbook, The Economy, as follows: “It (The Economy) begins with the biggest of big pictures, explaining how capitalism and industrialisation transformed the world, inviting students to contemplate how it arrived at where it is today. Messy complications, from environmental damage to inequality, are placed firmly in the foreground. It explains cost curves, as other introductory texts do, but in the context of the Industrial Revolution, thus exposing students to debates about why industrialisation kicked off when and where it did. Thomas Malthus’s ideas are used to teach students the uses and limitations of economic models, combining technical instruction with a valuable lesson from the history of economic thought.”⁶

In the light of foregoing, we would like to propose to adopt this approach in teaching the conventional economics and collaborate with the CORE Team (The CORE Project, Economics Department University College London).⁷

Islamic Economics

With regard to the Islamic economics component, first we would like to suggest a methodology in line with the one adopted by the CORE group mentioned above. That is studying the economy rather than economics. The economy is the outcomes of economic activities, resulting in economic challenges in the real world. In contrast, economics is a way of analysis to understand the economy (i.e. real-world problems) by using facts, concepts, tools, and models. Accordingly, we should first pose prevailing socio-economic, moral, and political (related to institutions and governance) challenges faced by Islamic countries and then teach the current concepts and tools of both conventional and Islamic economics to arrive at solutions or answers. Pedagogically this flipped way can be more engaging for students in connecting them with real life issues.

⁶ See The Economist (2017)

⁷ As of July 2020, the departments of economics in seven universities in Turkey are using the CORE.

Such an approach has also been propounded by Wilson (2014), Chapra (2000), Chapra (2001), and Chapra (2014). Wilson (2014) referring to Tag el-Din (2013) says “...the emphasis for the next generation of Islamic economists should not be to try to develop more theory, but rather to focus on economic policy issues (Tag el-Din, 2013). At present there are no countries implementing economic policies that have been based on *maqāṣid*, which remains an ideal rather than a reality. The fault does not rest with governments however, but rather with the failure of academic researchers in Islamic economics to study the policy options

confronting modern states. Academics cannot and should not dictate policy, but by examining the merits and drawbacks of different economic choices they can provide valuable advice. Unfortunately, at present the Islamic economics literature does not provide any guidance in this respect.”⁸

The second issue we would like to raise is how best we can incorporate the *Maqasid*, i.e. the aspiration of Islam within the curriculum of Islamic economics. The aspiration (vision) of Islam is to realize the well-being of mankind (human development) by ensuring the enrichment of the following five components of human well-being: *human self (life), faith, intellect, posterity, and wealth*.

In realization of the *Maqasid* (the primary objective), there are corollary ingredients which play a crucial role in the enrichment of these five components of human well-being. These are high quality education, family integrity, equity, employment opportunities, good governance, youth development, social solidarity, poverty alleviation, and justice among others (the secondary objectives).⁹ Hence, the following subjects are considered as crucial to be taught: Family studies, income distribution, employment, youth, education, health, community development and cohesion, good governance, and building social character traits¹⁰ in

⁸ Similarly, Chapra (2000, 2001, and 2014) hold the view that the Islamic economics should have the task of analyzing the problems faced by Muslim countries. Thus, Islamic economics will be able to suggest a balanced package of policy proposals in the light of Islamic teachings to enable Muslim countries to perform the difficult task of actualizing their normative goals, the *Maqasid*, while simultaneously reducing their imbalances.

⁹ See Chapra (2008a) for an extensive exposition on this issue.

¹⁰ Moral values and rules of behaviour. Currently in the OIC countries there is a gap between Islamic norms and the actual behaviour of economic agents: corruption, living beyond means, conspicuous consumption, wastefulness of resources, lack of work

collaboration with other disciplines like sociology, psychology, political science, and institutional and behavioral economics.

As the current teaching of the conventional economics is trying to be more relevant to the challenges of society¹¹, the IEF programs should endeavor to adopt a similar approach. Today Muslims have been facing various challenges in realization of the Maqasid. One major part of the challenges pertains to the sluggish performance in economic development. More than half of the OIC countries (34 out of 57) are low and lower-middle income countries. Those countries which are close to high-income status could not leap into the high-income category, and thus break the middle-income trap more than a decade (e.g. Malaysia and Turkey). And those countries which are classified as high-income countries have been continuing as solely resource-based economies, highly dependent to external price shocks, and striving to diversify desperately.

Furthermore, the OIC countries (the other developing countries as well) are currently facing the following major economic policy issues: Maintaining the macroeconomic fundamentals, correcting the misallocation of resources and reallocating them to more productive areas, making governments effective in public service delivery and pursuing more active industrial policy. Rigorous efforts are needed to spur growth and development¹² in the OIC countries and any progress to be made will serve the realization of the well-being of the people.

Equally demanding policy areas facing the OIC countries are family disintegration, youth unemployment, weakening community cohesion, poor governance, rising inequality of income and wealth distribution, poverty, low quality education and poor health performance, lack of observance of moral and social values (at almost every level, i.e., individuals, families, corporate sector and public sector). The Muslim societies have been failing in most of these areas and most indicators are

ethics, lack of sense of fulfillment of contractual commitments, inter alia (see WB Governance indicators, and International Transparency Index among others). Chapra (2001) argues that Islamic economics should analyse factually the actual behaviour of economic agents and explain both why they behave the way they do and why they do not behave in an ideal way as cherished by divine moral values.

¹¹ In addition to the CORE Project, see Coyle (2012) and the Institute for New Economic Thinking (<https://www.ineteconomics.org>)

¹² See Banerjee and Duflo (2019) and (2020) and Cherif and Hasanov (2019)

pointing out in this direction. Any progress or lack thereof will have serious implications in realization of the Maqasid.

In order to address these issues, the IEF program may offer at least two additional courses: **social development** and **solutions for development**. The course on social development may deal with demographic and social trends affecting family institution, urbanization, and community cohesion. It may also elaborate on the emerging issues of youth, aging, income and wealth distribution, and poverty. As more and more studies point out the connection between high quality educational attainment and the level of development across the countries, the area of high quality education (material as well as moral) should deserve a special part either within the social development or separately.¹³ The analysis can be confined to the individual country level with a comparative view of other Muslim societies and the advanced countries.

The **solutions for development** course can be complementary to the first one, where the IEF program can review the various already existing and potential solutions to the current challenges Muslim societies are facing. This way may lead to nurture promising practical solutions which may guide policy makers at various levels, central and local government and corporate sector. We should emphasize here it may be appropriate to benefit from the experience of other countries that have made important progress in dealing with these challenges as long as these solutions are not in conflict with the vision of Islam.¹⁴

Furthermore, it is considered relevant to introduce one more course to the IEF curriculum, that is **Rise and Fall of Muslim civilization** (economic, social, political and cultural aspects).¹⁵ This course may bring an historical background to the current situation prevailing in the Muslim economies by reviewing the possible factors which have played major roles in their performance. It may also be more meaningful if the major elements of Islamic economic thought are infused into this course.

¹³ See Hanushek and Woessmann (2015), Pritchett (2013) and OECD (2010) among others.

¹⁴ Hidayat et al. (2020) refers to a similar approach introduced recently in Indonesia as part of the new policy of higher education, where students are required to be involved in community development project in solving the communities' problems through the implementation of Islamic economic and financial tools.

¹⁵ Chapra (2008b) is an important contribution in this respect. Also see Siddiqi (2014).

Orientation Component

The last proposal for the curriculum is related to the first semester. The first-year students are fresh graduates from high schools, who are not generally equipped with conceptual thinking to be able to relate abstract concepts to the real-world economic phenomena. Exposing them to the abstract concepts of textbooks from the very beginning is not a motivating and effective teaching method. Hence, we can design a first-semester program where executives from business community can deliver a series of seminars and interactive discussions on the real-world economic and finance concepts such as markets, demand, supply, price, cost, etc. This way can bring the expertise of businessmen to the curriculum and provide opportunities for students and faculty for a better integration between theory and practice.¹⁶

A parallel practice has been introduced at International Center for Education in Islamic Finance (INCEIF) to ensure students are aware of Islamic finance practice. Two initiatives have been launched in this regard, namely Professor of Practice and Action Based Learning Schemes¹⁷. Under the first one, senior industry practitioners are appointed to co-teach a subject or to co-supervise a student's project with another faculty member. Under the Action Based Learning, students under the supervision of a faculty member and leading industry practitioner identify and propose solutions to real-world business issues faced by enterprises and Islamic financial institutions.

Conclusion

Two major developments have led to write this paper, namely "new ways of teaching conventional economics in the wake of 2008 financial crisis" and greater interest in Islamic economics and finance programs in universities globally. The common factor here is how to make the teaching of these two areas relevant to the realities of economic activities so that both students and industry players would be more satisfied and equipped with the skills set which may match with the expectations of the industries.

¹⁶ See Kent (2007)

¹⁷ INCEIF (2020)

The paper also raises the need to enrich the program of IEF with more emphasis on the maqasid (promotion of well-being of human beings) aspects with practical policy orientation in order to address current economic and social challenges the Muslim societies facing.

It may also be pertinent to expose the IEF students to an historical perspective of “Rise and Fall of Muslim Civilization”-cum-history of economic thought. This would facilitate the linking of the past to the current situation in Muslim countries.

Last but not the least it may also be relevant to bring the markets to the students from the very beginning. The first semester can be designed in a way that students may be exposed to a series of seminars and discussions with executives from business community. Thus, such a practice would serve two purposes: business players can be involved actively in being part of the curriculum and students can better grasp abstract concepts and connect with theoretical and practical issues.

References

- Banerjee, Abhijit. V. and Esther Duflo (2019), *Good Economics for Hard Times*, Public Affairs, New York
- Banerjee, Abhijit. V. and Esther Duflo (2020), 'How Poverty Ends: The Many Paths to Progress—and Why They Might Not Continue,' *Foreign Affairs*, January/February 2020
- Chapra, M. Umer (2000), *The Future of Economics: An Islamic Perspective*, The Islamic Foundation, UK
- Chapra, M. Umer (2001), *What is Islamic Economics*, Islamic Research and Training Institute/IDB, Jeddah
- Chapra, M. Umer (2008a), *Muslim Civilization: The Causes of Decline and the Need for Reform*, The Islamic Foundation, UK
- Chapra, M. Umer (2008b), *The Islamic Vision of Development in the Light of Maqasid Al-Shari'ah*, Islamic Research and Training Institute/IDB, Jeddah
- Chapra, M. Umer (2014), Is it Necessary to Have Islamic Economics, in Chapra, *Morality and Justice in Islamic Economics and Finance*, Edward Elgar Publishing, Cheltenham UK.
- Cherif, Reda and Fuad Hasanov (2019), 'The Return of the Policy That Shall Not Be Named: Principles of Industrial Policy,' IMF Working Paper 19/74,
- Giles, Chris (2008), 'The Economic Forecasters' Failing Vision' *The Financial Times*, November 25
- Coyle Diana (ed.), (2012), *What's the Use of Economics?: Teaching the Dismal Science After the Crisis*, London Publishing Partnership, UK
- Hafsa, Zeynep, O. (2017), *Türkiye'de İslam İktisadı ve Finansı Lisansüstü Programları Müfredatı*, (Curricula of Graduate Programs in Islamic Economics and Finance in Turkey), IKAM (İslam İktisadı Araştırmalar Merkezi- Center for Research on Islamic Economics), Istanbul
- Hanushek E. A. and Woessmann L. (2015), *The Knowledge Capital of Nations: Education and Economics of Growth*, CESifo Book Series, MIT Press

Hidayat, Sutan E., Sudarmawan Samidi and Atiqoh Nasution, (2020) '*The Alignment of Islamic Economics Curriculum with the New Directive Policy of Indonesian Education Minister*', paper presented at the 12th International Conference on Islamic Economics and Finance, Istanbul

Huda, N., Rini, N., Anggraini, D., Hudori, K., Mardoni, Y. (2016). '*The Development of Human Resources in Islamic Financial Industries from Economic and Islamic Financial Graduates.*' *Al-Iqtishad: Jurnal Ilmu Ekonomi Syariah* (Journal of Islamic Economics), Vol. 8 (1)

INCEIF (2020), Taking Islamic Finance Education to New Heights, INCEIF Refinitiv Islamic Finance Knowledge Outlook Report 2020

Kent, Muhtar (2007), Remarks to the 15th CEEMAN Annual Conference presented at the Conference, Istanbul, (The Central and East European Management Development Association (CEEMAN))

Muller, S., M., Chelwa, G., and Hoffman, N. (2019), '*How randomised trials became big in development economics,*' *The Conversation*, December 2019

Nu'man, R., ve Ali, S. N. (2016). '*Islamic Economics and Finance Education: Consensus on Reform,*' *Journal of Islamic Economics, Banking and Finance*, 12(3), 75-97.

OECD (2010), *The High Cost of Low Educational Performance: Long-Run Economic Impact of Improving PISA Outcomes*, OECD, Paris

Pritchett L. (2013), *The Rebirth of Education*, Center for Global Development, Washington

Siddiqi, M. Nejatullah (2014), '*Islamic Economics: Where From, Where To?*,' *Journal of King Abdulaziz University: Islamic Economics.*, Vol. 27 No. 2, pp: 73-78 (July 2014)

The Economist (2017), "*The Teaching of economics gets an overdue overhaul*", *Free Exchange*

Tag el-Din, Seif el-Din Ibrahim (2013) '*Maqāṣid Foundations of Market Economics*', Edinburgh: Edinburgh University Press, pp. 63-83

Wilson, R. (2014) *Comment on Islamic Economics: Where From, Where To?* (Muhammad Nejatullah Siddiqi), *Journal of King Abdulaziz University: Islamic Economics.*, Vol. 27 No. 2, pp: 73-78 (July 2014)

Assessing the Effects of COVID-19 on Stock Markets in the GCC Countries: Evidence from Sector-wise Panel Data Analysis

Hazem Al Samman¹ and Erhan Akkas²

ABSTRACT

This paper investigates the effect of the COVID-19 on the stock prices in service, industrial, and financial sectors using daily data for 295 companies from January 1, 2020, to February 23, 2021, in the GCC countries. The panel data techniques are utilized based sector-wise in each country: random-effect model, fixed-effect model, and Hausman test. The impact of COVID-19 was analysed during two phases. The first phase included analysing the financial markets' response from 01-01-2020 to 30-07-2020. The second phase is the analysis of the financial market response from 01-08-2020 to 23-02-2021. The first phase of results show that the COVID-19 outbreak leads to decreasing stock market prices in GCC countries. The empirical results show that the COVID-19 outbreak has badly hit the stock markets in Saudi Arabia, United Arab Emirates, and Qatar while the stock markets in Bahrain, Kuwait, and Oman are the least impacted countries in GCC. Furthermore, the sector-wise analysis results reveal that the financial sector in Saudi Arabia is the most affected by the COVID-19 outbreak in GCC countries. However, the response of stock markets to COVID-19 varied over time. The second phase's findings confirm that the negative impact of COVID-19 on stock markets in the GCC countries has faded in most sectors due to government support.

ملخص

تتناول هذه الورقة تداعيات كوفيد-19 على أسعار الأسهم في قطاعات الخدمات والصناعة والمالية باستخدام بيانات يومية عن 295 شركة في الفترة الممتدة ما بين 01 يناير 2020 و 23 فبراير 2021 في دول مجلس التعاون الخليجي. ويتم استخدام تقنيات بيانات اللوحة على أساس قطاعي في كل بلد: نموذج التأثير العشوائي، ونموذج

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التأثير الثابت، واختبار هاوسمان. وقد تم تحليل أثر كوفيد-19 خلال مرحلتين، شملت الأولى تحليل استجابة الأسواق المالية من 01-01-2020 إلى 30-07-2020. والمرحلة الثانية تضمنت تحليل استجابة السوق المالية من 01-08-2020 إلى 23-02-2021. وتبين من نتائج المرحلة الأولى أن تفشي كوفيد-19 يؤدي إلى انخفاض أسعار سوق الأوراق المالية في دول مجلس التعاون الخليجي. كما تظهر النتائج التجريبية أن تفشي كوفيد-19 قد أصاب أسواق الأسهم في المملكة العربية السعودية والإمارات العربية المتحدة وقطر، في حين أن كانت هذه الأسواق في البحرين والكويت وعمان أقل تأثراً من بين بلدان مجلس التعاون الخليجي. وعلاوة على ذلك، تبين نتائج التحليل القطاعي أن القطاع المالي في المملكة العربية السعودية يعتبر الأكثر تضرراً من تفشي كوفيد-19 في بلدان مجلس التعاون الخليجي. غير أن استجابة أسواق الأوراق المالية للجائحة تميزت بالتباين بمرور الوقت. وتؤكد نتائج المرحلة الثانية أن الأثر السلبي لكوفيد-19 على أسواق الأوراق المالية في دول مجلس التعاون الخليجي قد تلاشى في معظم القطاعات بسبب الدعم الحكومي.

ABSTRAITE

Cette étude examine l'effet de la COVID-19 sur les prix des actions dans les secteurs des services, de l'industrie et de la finance en utilisant les données quotidiennes de 295 entreprises du 1er janvier 2020 au 23 février 2021 dans les pays du CCG. Les techniques de données de panel sont utilisées en fonction du secteur dans chaque pays : modèle à effet aléatoire, modèle à effet fixe et test de Hausman. L'impact de COVID-19 a été analysé en deux phases. La première phase comprend l'analyse de la réponse des marchés financiers du 01-01-2020 au 30-07-2020. La deuxième phase est l'analyse de la réponse des marchés financiers du 01-08-2020 au 23-02-2021. Les résultats de la première phase montrent que l'épidémie de COVID-19 entraîne une baisse des prix des marchés boursiers dans les pays du CCG. Les résultats empiriques montrent que l'épidémie de COVID-19 a gravement touché les marchés boursiers d'Arabie Saoudite, des Emirats Arabes Unis et du Qatar, tandis que les marchés boursiers de Bahreïn, du Koweït et d'Oman sont les pays les moins touchés dans le CCG. En outre, les résultats de l'analyse sectorielle révèlent que le secteur financier en Arabie Saoudite est le plus touché par l'épidémie de COVID-19 dans les pays du CCG. Cependant, la réponse des marchés boursiers au COVID-19 a varié dans le temps. Les résultats de la deuxième phase confirment que l'impact négatif du COVID-19 sur les marchés boursiers des pays du CCG s'est estompé dans la plupart des secteurs grâce au soutien du gouvernement.

Keywords: COVID-19, Stock Markets, GCC Countries

JEL Classification: O57, O53, C33, E44

1. Introduction

COVID-19 has affected the economic and social life in the world as precedent pandemics. After the COVID-19 outbreak occurred in Wuhan, China, in December 2019, its impact was initially thought to be local but soon spread to other cities in China and then to the whole world. In the first period, countries such as Iran in the middle east and Italy in Europe were most affected (McKibbin and Fernando, 2020). On March 11, 2020, the World Health Organization officially announced that the COVID-19 outbreak was a global pandemic (WHO, 2020). Following this, the economic effects of the pandemic also manifested themselves. Necessary measures are required to discuss the health effects of this COVID-19 pandemic and its economic effects. It is argued that the restricted economic activities will affect the global supplies, tourism and aviation sectors, and global supplies intensely in the first place, but will lead to increased unemployment and economic contractions in the long run (Zhang *et al.*, 2020). Thus, companies will be in financial liquidity shortage that cannot protect their profitability. Ultimately, if there is no government support, these companies may be closed down.

For this reason, it is possible to state that financial markets are profoundly affected by this process. Since the impact of the COVID-19 will be as significant as the present, the stock market will be affected in the future. Therefore, investors will tend to sell stocks due to concern for the future (Liu *et al.*, 2020). From these reasons, financial markets need more attention in this pandemic period to protect them against the financial effects of the COVID-19.

In addition to global impact, it is essential to state the regional impact of the COVID-19. This is exemplified by the fact that the Gulf Cooperation Council (GCC) Countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates) represent the new faces of economic prosperity with considerable financial accumulation through natural resources revenues (Mishrif & Akkas, 2018). As a consequence of natural resources revenues, oil and gas, the GCC states now have an influential position in the global economy; their involvement in global economics affects a variety of areas, including trade integration, the stock market, government investment and the creation of various financial funds (Hertog, 2007). This involvement has enabled these countries to play a crucial role in the global financial system, particularly since the post-2000 era (Mishrif and

Akkas, 2018). Moreover, it is notable that the GCC countries' economies have accumulated massive financial reserves since 2000 (Rehman, 2010), which has led to fundamental transformations in the topography of the global economy. However, it becomes unavoidable that these countries are also influenced deeply by the financial impact of COVID-19 and its health effect.

Along with the general background of the COVID-19 and its global and regional impact, this paper argues that COVID-19 negatively affect the GCC countries' stock markets that engage the global financial system through their natural resources revenues. In correspondence with this argument, the main question of the paper is looking for how COVID-19, empirically, affects the stock market in the GCC countries. Therefore, presenting this problem empirically constitutes the main motivation of the paper. In order to achieve this objective, this paper is comprised of six sections. Following the introduction, the second section examines the impact of pandemics on the financial markets and stock markets in particular in order to present the relationship between pandemics and stock markets. The third section presents the GCC countries' development regarding the evolving of the COVID-19 and fluctuation in the stock markets. The fourth section uses the Hausman test to select between a random-effects model or fixed-effects model in panel analysis using daily new COVID-19 cases and total COVID-19 cases and stock prices from six GCC countries. The fifth section provides the data collection process and econometric analysis results by considering each sector and country in the GCC countries. The last section concludes with an overall evaluation taking into consideration all of the results.

2. Reviewing the Nexus between the Pandemics and Stock Markets

Stock markets are likely affected by any crisis or disasters caused by the environmental (Alsaifi *et al.*, 2020; Guo *et al.*, 2020), political (Bash and Alsaifi, 2019; Shanaev and Ghimire, 2019) and economic factors (Bala and Takimoto, 2017; Cakan *et al.*, 2015) in the world or a particular country. Also, there are limited studies regarding the effects of pandemics such as Severe Acute Respiratory Syndrome (SARS) outbreak (Beutels *et al.*, 2009; Chen *et al.*, 2009; Chen *et al.*, 2007; Chen *et al.*, 2018) and Ebola Virus Disease (EVD) outbreak (Ichev and Marinč, 2018) in the world. However, during the COVID-19, there are some studies, which have examined the effect of the COVID-19 pandemic on the stock

markets (Al-Awadhi *et al.*, 2020; Ashraf, 2020; Baker *et al.*, 2020; Liu *et al.*, 2020; Ozili and Arun, 2020; Zhang *et al.*, 2020) even though it occurred very recently.

According to recent studies with the COVID-19, Liu *et al.* (2020) discuss the impact of the COVID-19 outbreak on stock market indices of 21 leading countries. This study concluded that COVID-19 pandemic has a significant and negative effect on stock markets in sampled countries. In a similar study, Baker *et al.* (2020) compare the effects of COVID-19 on the US stock markets with the outbreaks experienced in previous years (1918-1919, 1957-1958 and 1968), they concluded that the current pandemic has more compelling power on economy. Ozili and Arun (2020) examines the effects of social distance policies on economic activities and the stock market; finds that the measures taken have adverse effects on economic activities and share prices (closing, opening, lowest and highest).

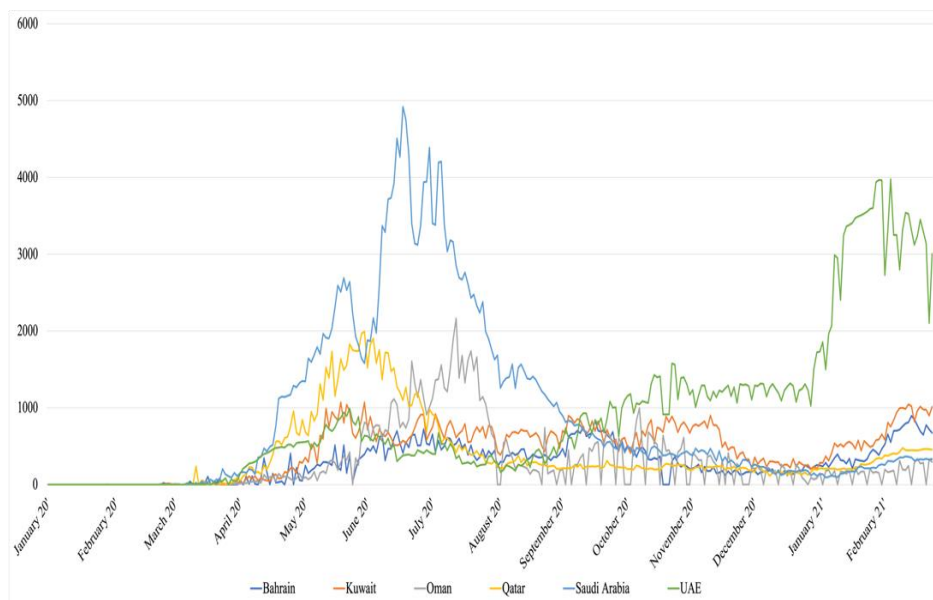
Reaching similar results, Ashraf (2020) examines the reaction of stock market markets in 64 countries to COVID-19 cases and deaths; concludes that stock market markets respond very quickly to the number of cases and are negatively affected by these situations. By considering risk factors, Zhang *et al.* (2020) produces a general map of country-specific risks and systemic risks in the global financial markets and concludes that the stock markets' response to the pandemic in the top ten countries is related to the severity of COVID-19 cases. They also remark that losses in economies in countries cause volatility and unpredictability in the stock markets. Al-Awadhi *et al.* (2020) examined the effect of COVID-19 on the stock market in China. They conclude that daily COVID-19 cases and deaths have negative and significant effects on all companies' stock returns. Contrary to these results, Onali (2020) finds that COVID-19 cases and deaths do not affect the US stock market despite finding a positive effect on Dow Jones and S& P500 returns in some countries in the sample. Besides, he finds that death cases in Italy and France have a negative effect on stock market returns in these countries, while VIX has a positive effect on returns.

Based on the literature mentioned in this section, it is possible to state a relationship between stock markets and COVID-19, whether positive or negative. When it comes to financial markets, GCC countries are worth analysing because they have a global size due to their current oil revenues

and have an important place in the global financial system. In addition, these countries are directly affected by the crises, as they have an economy that is not diversified (Ari *et al.*, 2019). However, as the current pandemic's effect differs according to the sector, the stock markets of these countries will be examined on a sectoral basis. Also, as the initial impact of the pandemic will decline with government support, it will be subject to two different analyses before and after the breakout period. From this point of view, this paper performs a comparative analysis by sector and countries in the GCC countries. By doing this, this paper contributes to the literature.

3. How Does COVID-19 Evolve in the GCC Countries?

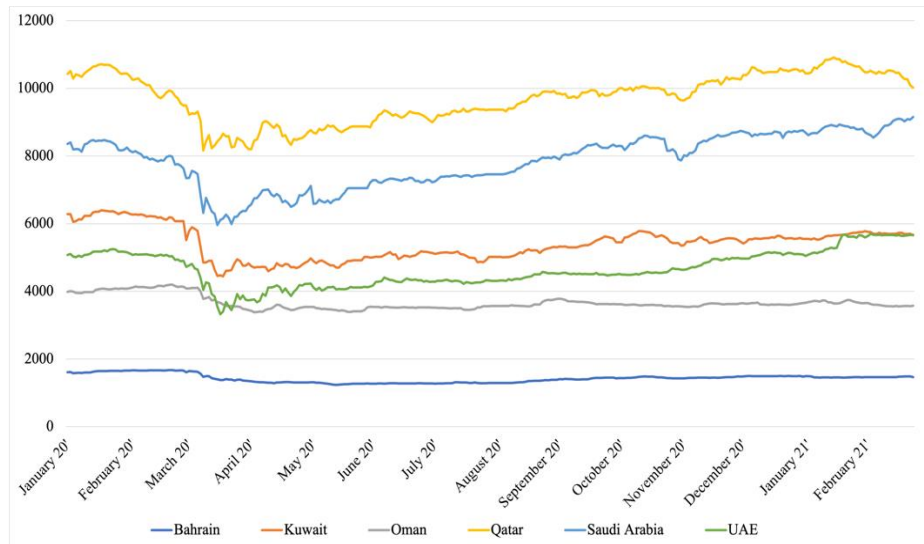
The first case in GCC countries was detected on January 29, 2020, in a family from China in the UAE (Duncan, 2020). Then there was news of the cases in the other GCC countries. The first cases were generally seen in citizens and expatriates who visited Iran (Alandijany *et al.*, 2020). Subsequently, measures have been taken in each GCC countries. Showing a parallel with the world, some preventive measures were closing schools, suspending flights, closing workplaces, closing places of worship and expanding sterilisation activities. Despite all these measures, the number of cases in GCC countries has increased day by day. The reasons for this increase may be that there are too many expatriates in these countries. Travels of expatriates increased the cases in these countries. For example, over 3000 Indians have been infected until April across the world, and about 60% of them are located in the GCC countries (Özoral, 2020). In this case, GCC countries take measures for expatriates. As a result of this fact, it is possible that indicate that the GCC countries' economies can be affected negatively by these measurements against expatriates because of their demographic imbalances.

Figure 1: COVID-19 New Cases in the GCC Countries

Source: Thomson Reuters Datastream

As seen in Figure 1, there has been a few cases until March, but the new cases have increased from March. Saudi Arabia, which has the largest population among the GCC countries, ranks first with a total number of nearly 50000 cases as of mid-May. Saudi Arabia is followed by Qatar, although it is one of the countries with the lowest population among GCC countries. The total number of cases close to 30000 is observed in Qatar. The third country with the highest number of cases is seen in the UAE. According to this figure, the most remarkable country is Oman and Qatar. Although Qatar has the lowest population after Bahrain in the Gulf region (Center, 2020), it ranks second in the number of cases after Saudi Arabia. Oman has the lowest number of cases in the region, although it is the third country with the highest population in the Gulf region. According to Figure 1, while the UAE has seen an increase in new cases since July, there has decreased in other GCC countries. Since October, the country with the highest number of daily cases has been the UAE. However, by 2021 there is an increase in new cases in all GCC countries.

Figure 2: Stock Market Price Indexes in the GCC Countries



Source: Thomson Reuters Datastream

As shown in Figure 2, March was the breaking point for markets. Looking at the same period, the total number of cases and new cases started to increase in the region. The stock markets in GCC countries have been adversely affected by the world COVID-19 cases; as seen in Figure 2, there has been a negative relationship between stock markets and COVID-19 cases. While the COVID-19 cases have increased, stock market prices decreased. The COVID-19 cases have fluctuated by increasing, stock market prices indexes have also fluctuated but by declining in April and May.

The conclusion drawn from both figures shown is that the effect of this situation on the stock markets, together with the fluctuations in the new cases, may be different in empirical results with the governments' different incentives. Furthermore, in some countries, such as the UAE, although new cases have increased after July, there is no similar change in the stock markets. Thus, it is worth to examine the impact of COVID-19 cases across the world on stock markets in GCC countries empirically, as these countries are important actors in the global financial system.

4. Methodology

Panel data analysis is used in each sector for each country to deal with two dimensional cross-sectional and time series. The fixed and random effects model is used to capture the effect of the COVID-19 outbreak on the stock prices in GCC countries. The equation (1) below represents the research model with the panel data of the random effect.

$$STOCK_{i,t} = a_0 + \beta_1 COVID_{i,t} + \beta_2 MC_{i,t} + (v_i + \varepsilon_{i,t}) \quad (1)$$

Where *STOCK* is the price of stock *i* at day *t*, $i=1, \dots$ and *N* represents the number of companies in each economic sector in each country (cross-sectional panel companies for the period *t*), $t=1, 2, 3 \dots T$ represents the number of periods. *COVID-19* is either the logarithm of the total confirmed world cases. *MC* is the logarithm of daily market capitalisation. $\varepsilon_{i,t}$ is the error term. $\varepsilon_{(i,t)}$ is the residual as a whole where the residual is a combination of cross-section and time series, v_i is the individual residual, which is the random character of unit observation.

In the fixed-effect model, the v_i are not treated as draws from any kind of distribution. Therefore, between effects (associations at a higher level) cannot be estimated, and the model can be reduced to:

$$STOCK_{i,t} = a_0 + \beta_1 COVID_{i,t} + \beta_2 MC_{i,t} + \varepsilon_{i,t} \quad (2)$$

This paper uses the Hausman test to select between a random-effects model or fixed-effects model in panel analysis to fit the research data to capture the effect of COVID-19 on stock prices in each economic sector of the GCC countries. The null hypothesis of the Hausman test is that the random-effects model is preferred or consistent, while the fixed-effects model is preferred under the alternative hypothesis. Baltagi (2005):

$$H' = (b_{FE} - b_{MEANS})' [Asy.Var[b_{FE}] + Asy.Var[b_{MEANS}]]^{-1} (b_{FE} - b_{MEANS}) \quad (3)$$

5. Data and Empirical Tests

5.1. Data Collection

The data in this paper include companies in the Bahrain Bourse (Bahrain Stock Exchange), Boursa Kuwait (Kuwait Stock Exchange), Muscat Securities Market, Qatar Stock Exchange, Tadawul (Saudi Stock Exchange), Abu Dhabi Securities Exchange, and Dubai Financial Market over the period from January 1, 2020, and February 23, 2021. Data, including stock prices and market capitalisation, were collected from Thomson Reuters Datastream and cover 295 companies categorised as services, industrial, and financial sectors. The data of total COVID-19 cases and daily new COVID-19 cases were collected from World Health Organization through Thomson Reuters Datastream.

5.2. Descriptive Statistics

Descriptive statistics and correlation matrix data are presented in Tables A1, A2, and A3 in the Appendix. The correlation matrix in Table A2 shows a negative relationship between the total number of world cases of COVID-19 and the stock price in all the sectors in all GCC countries in the first phase of analysis. In contrast, the correlation matrix in Table A3 indicates that there is no significant negative relationship between the total number of world cases of COVID 19 and the stock price in all the sectors in all GCC countries.

5.3. Empirical Tests

5.3.1. Service sector in GCC countries

The results of panel data analysis for the impact of total COVID 19 cases on stock prices in service companies in all GCC countries are illustrated in Tables 1 and 2. Table 1 shows the impact of COVID-19 from 01-01-2020 to 30-07-2020, while Table 2 shows the COVID-19 impact from 01-08-2020 to 23-02-2021.

Table 1: Results of Panel Data Fixed and Random Effect Models for the Effect of Total COVID-19 Cases on Stock Price in the Service Sector in GCC Countries from 01-01-2020 to 30-07-2021

Country	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE	All GCC Countries
Log World COVID-19 Cases	-0.0096***	-0.0061***	0.0058***	-0.0154***	-0.1781***	-0.0332***	-0.1555***
Log Market Capitalisation	0.0022	0.5406***	1.5276***	2.5472***	21.3967***	0.4683***	3.6148***
Constant	0.608***	-5.595***	-15.275***	-33.837***	-283.50***	-4.274***	-35.03***
Adjusted R-squared	0.2296	0.3240	0.5189	0.4414	0.5395	0.2424	0.1485
F-statistic	136.74***	583.55***	1066.01***	601.10***	3116.41***	438.54***	1300.31***
Hausman Test Chi-Sq. Statistic	0.000	0.000	0.000	0.000	0.000	0.000	0.0000
Model	Random effect	Random effect	Random effect	Random effect	Random effect	Random effect	Random effect

*** represents the significant level at 1%.

The Hausman test results in Table 1 indicate acceptance of the null hypothesis of the random effects model is consistent in the service sector in the GCC countries. The coefficients of total COVID 19 cases are negative and statistically significant at a 1 per cent level of significance. This means that the total COVID 19 cases have a negative effect on stock prices in service companies in the UAE, Saudi Arabia, Qatar, Kuwait, and Bahrain. The coefficient of total COVID-19 cases in the random-effect model for service companies in Oman small but positive and significant at a 1 per cent significance level. This is not a surprising result as the Omani government launched a comprehensive economic incentive package to support the companies and inject additional liquidity over US\$ 20.78 billion into the economy (OECD, 2020). There are two different potential explanations for this result. First, this result reflects the ability of service companies to respond to government procedures that aim to mitigate the effects of the COVID-19 outbreak on the economy. Second, the service sector did not reflect the new information about COVID-19 in stock prices as the stock market is not efficient even at weak-form of the efficient market hypothesis (Al Samman and Al-Jafari, 2015). As also shown in Table 1, the service companies in Saudi Arabia are the most affected by the COVID-19 outbreak with a coefficient of -0.1781, followed by UAE with a coefficient of -0.0332, while service companies in Kuwait are the least affected by COVID-19 outbreak among GCC countries with a coefficient of -0.0061. The analysis of service companies in all GCC countries indicates a negative impact of the spread of the COVID-19 on stock prices.

Table 2: Results of Panel Data Fixed and Random Effect Models for the Effect of Total COVID-19 Cases on Stock Price in the Service Sector in GCC Countries from 01-08-2020 to 23-02-2021

Country	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE	All GCC Countries
Log World COVID-19 Cases							
Log	0.0050***	-0.0478***	0.0181***	0.1434***	0.3022***	0.2069***	0.2595***
Market Capitalisation							
Log	0.9059***	0.5839***	0.4734***	3.1990	35.7870***	1.4541***	19.9254***
Constant	-9.18***	-5.41 ***	-4.56***	-46.47***	-505.95***	-23.47***	-263.34***
Adjusted R-squared	0.9984	0.3395	0.5191	0.5672	0.7033	0.4556	0.9902
F-statistic	1480.71***	605.13***	1032.01***	963.77***	6098.02***	1107.83***	14637.63***
Hausman Test	12.57***	0.00	0.00	0.00	0.00	0.00	226.51***
Chi-Sq. Statistic							
Model	Fixed effect	Random effect	Random effect	Random effect	Random effect	Random effect	Fixed effect

*** represents the significant level at 1%.

The Hausman test results in Table 2 indicate acceptance of the random model's null hypothesis is consistent in the service sector in all GCC countries except Bahrain and the whole sample of GCC countries. The second phase analysis results for the impact of COVID-19 in all GCC countries indicate the disappearance of the negative impact of the spread of COVID-19 on stock prices in service companies. Furthermore, the analysis based country-wise shows no effect of the spread of COVID-19 on all service companies in all Gulf countries except Kuwait. On the contrary, there is a positive effect attributed to the companies' response to the economic support packages provided by the GCC governments with the increase in the spread of COVID-19. However, the results indicate the continued negative impact of the spread of COVID-19 on service companies in Kuwait. The F-test results indicate the null hypothesis of the F-test is rejected in all models presented in Tables 1 and 2. This means that all the models fit the research data, and the COVID-19 outbreak interprets the volatility pattern in the stock prices in the services companies in GCC countries during the research period.

5.3.2. The industrial sector in GCC countries

The results of panel data analysis for the impact of total COVID 19 cases on stock prices in industrial companies in all GCC countries are displayed in Tables 3 and 4. Table 3 shows the impact of COVID-19 from 01-01-2020 to 30-07-2020, while Table 4 shows the COVID-19 impact from 01-08-2020 to 23-02-2021.

Table 3: Results of Panel Data Fixed and Random Effect Models for the Effect of Total COVID-19 Cases on Stock Price in the Industrial Sector in GCC Countries from 01-01-2020 to 30-07-2020

Country	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE	All GCC Countries
Log World COVID-19 Cases	-0.0002***	-0.0011***	-0.0014***	-0.0037**	-0.2901***	-0.0038***	-0.0891***
Log Market Capitalisation	0.3627***	0.2135***	0.1566***	1.6490***	9.8873***	0.9994***	6.748***
Constant	-3.33***	-1.91***	-1.20***	-22.21***	-110.33***	-11.93***	-72.3***
Adjusted R-squared	0.9663	0.4809	0.6623	0.5950	0.2691	0.6414	0.978361
F-statistic	13075.12***	986.32***	1490.50***	893.37***	1008.19***	1087.63***	6790.08***
Hausman Test	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	22.82***
Chi-Sq. Statistic							
Model	Random effect	Random effect	Random effect	Random effect	Random effect	Random effect	Fixed effect

*** represent the significant level at 1%.

The results in Table 3 show that the value of the Chi-Square Statistic in the Hausman test is not significant in all the GCC countries except the entire GCC sample. This result concludes that the random-effects model is consistent with the fixed-effects model in industrial companies of all GCC countries and the fixed-effect model for all GCC countries.

The coefficients of total COVID-19 cases in the random-effects models are negative and statistically significant at a 1 per cent level of significance in all GCC countries. Moreover, the analysis of industrial companies in all GCC countries indicates a negative impact of the spread of the COVID-19 on stock prices. This means that the increase in confirmed cases of COVID-19 has a negative impact on industrial stock prices in all GCC countries. However, the magnitude of the negative impact was not the same in all Gulf countries. The coefficient of total COVID-19 cases in industrial companies in Saudi Arabia is -0.2901, which is the highest in GCC countries. This result means that the industrial companies in Saudi Arabia are the highest affected by the COVID-19 outbreak. This result is unexpected in the largest economy in GCC countries, especially after costly support packages targeting the private sector, totalling almost US\$ 61 billion (KPMG, 2020a). The lowest coefficient of industrial companies in GCC countries has been reported in Bahrain with a value of -0.0002. This result has come in response to the government support by launching an economic stimulus package amounting to US\$ 11 billion to support individuals and companies.

Table 4: Results of Panel Data Fixed and Random Effect Models for the Effect of Total COVID-19 Cases on Stock Price in the Industrial Sector in GCC Countries from 01-08-2020 to 23-02-2021

Country	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE	All GCC Countries
Log World COVID-19 Cases	0.0213***	0.0066***	0.0076***	-0.051***	4.2992***	0.1506***	0.8048***
Log market Capitalisation	0.1742***	0.0937***	0.1614***	2.0529***	46.4496***	2.0934***	43.023***
Constant	-1.82***	-0.77***	-1.40***	-27.40***	-715.39***	-29.19***	-550.51***
Adjusted R-squared	0.9825	0.2661	0.8133	0.6016	0.4490	0.7668	0.904
F-statistic	7055.29***	373.96***	3201.52***	888.17***	2156.68***	1933.15***	1369.49***
Hausman Test	18.009***	0.991615	0	0	0	0	553.15***
Chi-Sq. Statistic							
Model	Fixed effect	Random effect	Random effect	Random effect	Random effect	Random effect	Fixed effect

*** represent the significant level at 1%.

In Table 4, the Hausman test results confirm that the random-effects models are consistent for all industrial companies in GCC countries except Bahrain and the whole GCC sample. The second phase analysis results for the impact of COVID-19 in all GCC countries indicate the disappearance of the negative impact of the spread of COVID-19 on stock prices in industrial companies. Furthermore, the analysis based country-wise shows that the negative impact of the COVID-19 outbreak on industrial companies faded in all GCC countries except Qatar. This indicates the success of economic support packages in mitigating the spread of the COVID-19 on the economy. Despite this fact, the results indicate that Qatar's industrial companies continue to be affected by the repercussions of the spread of the COVID-19. The F-test confirms that all the models presented in Tables 3 and 4 fit the research data, which means that the variable of COVID-19 cases explains the share prices movements during the study period.

5.3.3. The financial sector in GCC countries

The results of panel data analysis for the impact of total COVID 19 cases on stock prices in financial companies in all GCC countries are presented in Tables 5 and 6. Table 5 shows the impact of COVID-19 from 01-01-2020 to 30-07-2020, while Table 6 shows the COVID-19 impact from 01-08-2020 to 23-02-2021. Table 5 shows that the Hausman test's null hypothesis cannot be rejected in all GCC countries except Bahrain. This leads to using the Fixed-effects model in Bahrain and the random-effects models in the UAE, Saudi Arabia, Qatar, Kuwait, and Oman.

Table 5: Results of Panel Data Fixed and Random Effect Models for the Effect of Total COVID-19 Cases on Stock Price in the Financial Sector in GCC Countries from 01-01-2020 to 30-07-2020

Country	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE	All GCC Countries
Log World COVID-19 Cases	-0.0025***	-0.0020***	-0.0001	-0.0353***	-0.3584***	-0.0568***	-0.0707***
Log market Capitalisation	0.3140***	0.1914***	0.1949***	1.9924***	4.4868***	1.8423***	2.4361***
Constant	-3.64***	-2.04***	-1.88***	-23.68***	-42.89***	-20.76***	-25.62***
Adjusted R-squared	0.9707	0.6383	0.5294	0.4949	0.5110	0.2257	0.1967
F-statistic	4523.18	3085.34	1710.31	1042.81	1906.32	554.56	2028.75***
Hausman Test	17.5792	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Chi-Sq. Statistic							
Model	Fixed effect	Random effect	Random effect	Random effect	Random effect	Random effect	Random effect

*** represent the significant level at 1%.

As shown in Table 5, the results of the analysis of financial companies in all GCC countries indicate a negative impact of the spread of the COVID-19 on stock prices. Moreover, the coefficients of total COVID 19 cases in random-effects and fixed-effect models are negative and statistically significant at a 1 per cent level of significance in financial companies in all GCC countries except Oman. The highest coefficient of total COVID-19 in financial companies is reported in Saudi Arabia with a value of -0.3584, followed by the UAE with a coefficient of -0.0568.

Table 6: Results of Panel Data Fixed and Random Effect Models for the Effect of Total COVID-19 Cases on Stock Price in the Financial Sector in GCC Countries from 01-08-2020 to 23-02-2021

Country	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE	All GCC Countries
Log World COVID-19 Cases							
Log Market Capitalisation							
Constant	-0.0043***	-0.0034***	0.0002	0.0442***	0.1790***	0.1697***	0.4912***
Adjusted R-squared	0.1363***	0.2915***	0.0613***	2.7445***	25.4901***	1.4610***	3.2519***
F-statistic	-1.35***	-3.22***	-0.49***	-35.85***	-365.02***	-19.18***	-45.44***
Hausman Test	0.4211	0.6865	0.7353	0.9983	0.9945	0.1605	0.1702***
Chi-Sq. Statistic	481.88***	3702.22***	4082.68***	80543.37***	25277.69***	352.16***	1644.92***
Model	Random effect	Random effect	Random effect	Fixed effect	Fixed effect	Random effect	Random effect
	0.0000	0.0000	0.0000	4.7907	360.0889	0.4200	4.318788

*** represent the significant level at 1%.

As depicted in the Hausman test results in Table 6, the random-effects model is consistent in the financial companies in Bahrain, Kuwait, Oman and UAE. In contrast, the fixed-effect model is consistent for Saudi Arabia and Qatar. The second phase analysis results for the impact of COVID-19 in all GCC countries indicate the disappearance of the negative impact of the spread of COVID-19 on stock prices in financial companies. Furthermore, the analysis based country-wise shows that the negative impact of the COVID-19 outbreak on financial companies disappeared in all GCC countries except Bahrain and Kuwait. The results indicate that the financial sector in both Bahrain and Kuwait continue to be affected by the repercussions of the COVID-19 pandemic. In contrast, Government economic interventions in the rest of the GCC countries have succeeded in helping the financial sector cope with the COVID-19 crisis. The F-test value is statistically significant in all models in financial companies in GCC countries in Table 5 and 6. This result confirms that the COVID-19 outbreak is the crucial driving force in the stock prices in the financial companies in GCC countries during the research sample period.

5.3.4. Country Analysis

Based on the research results, the most affected country in GCC countries from the repercussions of the COVID-19 outbreak is Saudi Arabia. Despite the government launching large economic support packages, its economic sectors have been badly hit by the COVID-19 outbreak. The financial sector has been among the severest hit by the COVID-19 pandemic, followed by industrial sector then services sector. However, the negative impact on stock markets lasted until the end of July 2020, then companies responded positively to the government's support, and the negative impact faded on all economic sectors.

The badly hit also comes to the most diversified economy in the GCC, the UAE economy, despite a much-quick response deployment of a US\$ 27 billion stimulus package to attempt to reduce the impact of the COVID-19 on the economy (KPMG, 2020b). The financial sector has been the worst hit by the COVID-19 in the UAE, followed by the services sector and then the industrial sector that is considered the least impacted sector by the COVID-19 outbreak. The negative impact on the financial markets in the UAE also continued until the end of July. The results of the second phase confirm that the stock markets in the UAE were able to overcome

the repercussions of the COVID-19 and respond to the government's measures to revive the economy. It is possible to state that the UAE government's economic incentives have been positively affected by the fact that the stock markets in the UAE are far from the initial negative impact of this situation, despite the increase in new cases in the UAE since July, as presented in Figure 1.

Qatar is the third most affected country in GCC by the COVID-19 outbreak despite various government support packages that have reached nearly US\$ 20.3 billion, including nearly US\$ 2.7 billion in government funds in the financial market (Dinesh Nair *et al.*, 2020). The financial sector in Qatar is the hardest hit by the COVID-19 outbreak, followed by the services sector then the industrial sector. The results of the second phase, which extends from 01-08-2020 to -23-02-2021, confirm that the industrial companies continue to be affected by the COVID-19 pandemic.

The ongoing impact of the COVID-19 repercussions is still widely seen and is significantly impacting several industries. The financial sector in Kuwait and Bahrain and the service sector in Kuwait are continuing to be affected by the COVID-19 pandemic, although new cases in these countries have decreased since July.

6. Conclusion

The GCC countries represent the new face of economic prosperity, accumulating financial wealth generated through natural resources revenues. These countries have played a pivotal role in the global financial system through the new face of wealth. Thus, GCC countries have begun to use their wealth to reconfigure their position in the global financial system. From this point of view, these countries can likely be affected by any regional or global crisis arising from political, economic, environmental, natural disaster, and healthcare issues, all of which negatively the global financial system. Therefore, this research examines the effect of COVID-19 on the stock prices in all the sectors in GCC countries using daily data for the period January 1, 2020, to February 23, 2021. The impact of COVID-19 was analysed during two phases. The first phase included analysing the financial markets' response from 01-01-2020 to 30-07-2020. The second phase is the analysis of the financial market response from 01-08-2020 to 23-02-2021.

According to econometric analysis for the first phase, the results confirm statistically that the COVID-19 outbreak leads to a decreasing pattern in stock market prices in the GCC countries. However, COVID-19 repercussions do not have the same impact on all countries and industries. Based on the analysis made for each sector in each country, it can be observed that the sector most affected by the COVID-19 in GCC countries is the financial sector followed by the industrial sector in Saudi Arabia where is a more industrialised country in the GCC countries, despite government support for companies, which reached US\$ 13 billion. On the other hand, the industrial sector in Bahrain, Kuwait, and Oman is the least affected sector by spreading the COVID-19. As for the service sector, it can result that all GCC countries except Oman are negatively affected by COVID-19. It can be related to the economic structure of the GCC countries, where heavily based on the service sector. Lastly, the financial sector is affected by COVID-19 except for Oman. This result can be related to the financial structure of the GCC countries, which are heavily financialised countries through their natural resource revenues except for Oman. In general, listed companies in the stock markets of the GCC countries under the three sectors, namely industrial, service, and financial sectors, in the GCC countries are affected by the COVID-19. However, its impact on the stock markets differs from country to country in the GCC countries, as these countries have a pivotal role in the global financial system through their wealth generated by natural resources revenues.

The results of the second phase confirm that companies responded positively to the governments' support in all GCC countries. Therefore, the negative impact of COVID-19 on stock markets in all sectors disappeared. However, some sectors are continuing to be affected by the COVID-19 pandemic, which are the industrial sector in Qatar, the financial sector in Kuwait and Bahrain, and the service sector in Kuwait.

Finally, this research looks at stock price effects, which reflect the expectations of market participants for future economic consequences. However, it is worth indicating that the impact of the COVID-19 outbreak on GCC stock markets was relatively modest even over periods of several months. The ongoing assessment of the effects of the COVID-19 outbreak on the economy is still open, and this paper analyses and results are limited with the research period from January 1, 2020, to February 23, 2021, but contribute to the literature.

References

Al Samman, H. and Al-Jafari, M. K. (2015), "Trading volume and stock returns volatility: Evidence from industrial firms of Oman," *Asian Social Science*, 11(24), 139-146.

Al-Awadhi, A. M., Al-Saifi, K., Al-Awadhi, A. and Alhamadi, S. (2020), "Death and contagious infectious diseases: Impact of the COVID-19 virus on stock market returns," *Journal of Behavioral and Experimental Finance*, 100326.

Alandijany, T. A., Faizo, A. A. and Azhar, E. I. (2020), "Coronavirus disease of 2019 (COVID-19) in the Gulf Cooperation Council (GCC) Countries: Current status and management practices," *Journal of Infection and Public Health*, 13(6), 839-842.

Alsaifi, K., Elnahass, M. and Salama, A. (2020), "Market responses to firms' voluntary carbon disclosure: Empirical evidence from the United Kingdom," *Journal of Cleaner Production*, 121377.

Ari, I., Akkas, E., Asutay, M. and Koç, M. (2019), "Public and private investment in the hydrocarbon-based rentier economies: A case study for the GCC countries," *Resources Policy*, 62, 165–175.

Ashraf, B. N. (2020), "Stock markets' reaction to COVID-19: Cases or fatalities?," *Research in International Business and Finance*, 101249.

Baker, S. R., Bloom, N., Davis, S. J., Kost, K. J., Sammon, M. C. and Viratyosin, T. (2020), "The unprecedented stock market impact of COVID-19," *National Bureau of Economic Research*. No. w26945.

Bala, D. A. and Takimoto, T. (2017), "Stock markets volatility spillovers during financial crises: A DCC-MGARCH with skewed-t density approach," *Borsa Istanbul Review*, 17(1), 25-48.

Baltagi, B. (2005), *Econometric analysis of panel data*, 3rd edition, John Wiley & Sons: England

Bash, A. and Alsaifi, K. (2019), "Fear from uncertainty: An event study of Khashoggi and stock market returns," *Journal of Behavioral and Experimental Finance*, 23, 54-58.

Beutels, P., Jia, N., Zhou, Q. Y., Smith, R., Cao, W. C. and De Vlas, S. J. (2009), "The economic impact of SARS in Beijing, China," *Tropical Medicine & International Health*, 14, 85-91.

Cakan, E., Doytch, N. and Upadhyaya, K. P. (2015), "Does US macroeconomic news make emerging financial markets riskier?," *Borsa Istanbul Review*, 15(1), 37-43.

Center, G. R. (2020), Gulf labour markets, migration, and population (GLMM) programme, <https://gulfmigration.org/>

Chen, C. D., Chen, C. C., Tang, W. W. and Huang, B. Y. (2009), "The positive and negative impacts of the SARS outbreak: A case of the Taiwan industries," *The Journal of Developing Areas*, 43(1), 281-293.

Chen, M.H., Jang, S. S. and Kim, W. G. (2007), "The impact of the SARS outbreak on Taiwanese hotel stock performance: An event-study approach," *International Journal of Hospitality Management*, 26(1), 200-212.

Chen, M. P., Lee, C. C., Lin, Y. H. and Chen, W. Y. (2018), "Did the SARS epidemic weaken the integration of Asian stock markets? Evidence from smooth time-varying cointegration analysis," *Economic Research-Ekonomska Istraživanja*, 31(1), 908-926.

Dinesh Nair, Z. F., Archana N. and Nicolas P. (2020), "Qatar plans to raise \$5 billion after oil rout," Bloomberg. Available at: <https://www.bloomberg.com/news/articles/2020-04-02/qatar-said-to-hire-banks-to-raise-more-than-5-billion-in-bonds>

Duncan, G. (2020), "Coronavirus in the UAE: A timeline of new cases and recoveries," The National. Available at: <https://www.thenational.ae/uae/health/coronavirus-in-the-uae-a-timeline-of-new-cases-and-recoveries-1.985824>

Guo, M., Kuai, Y. and Liu, X. (2020), "Stock market response to environmental policies: Evidence from heavily polluting firms in China," *Economic Modelling*, 86, 306-316.

Hertog, S. (2007), "The GCC and Arab economic integration: A new paradigm," *Middle East Policy*, 14(1), 52-68.

Ichev, R. and Marinč, M. (2018), “Stock prices and geographic proximity of information: Evidence from the Ebola outbreak,” *International Review of Financial Analysis*, 56, 153-166.

KPMG. (2020a), Government and institution measures in response to COVID-19: Kingdom of Saudi Arabia, Available at: <https://home.kpmg/xx/en/home/insights/2020/04/saudi-arabia-government-and-institution-measures-in-response-to-covid.html>

KPMG. (2020b), Government and institution measures in response to COVID-19: United Arab Emirates, Available at: <https://home.kpmg/xx/en/home/insights/2020/04/united-arab-emirates-government-and-institution-measures-in-response-to-covid.html>

Liu, H., Manzoor, A., Wang, C., Zhang, L. and Manzoor, Z. (2020), “The COVID-19 outbreak and affected countries stock markets response,” *International Journal of Environmental Research and Public Health*, 17(8), 2800.

McKibbin, W. J. and Fernando, R. (2020), “The global macroeconomic impacts of COVID-19: Seven scenarios,” *CAMA Working Paper*, No. 19/2020. Available at: <https://ssrn.com/abstract=3547729>

Mishrif, A. and Akkas, E. (2018), “Exploring connexion between sovereign wealth funds and Islamic finance in the Gulf countries,” *International Journal of Economics and Finance*, 10(5), 75-86.

OECD. (2020), COVID-19 crisis response in MENA countries, Available at: <https://www.oecd.org/coronavirus/policy-responses/covid-19-crisis-response-in-mena-countries-4b366396/>

Onali, E. (2020), “Covid-19 and stock market volatility,” Available at: SSRN 3571453.

Ozili, P. K. and Arun, T. (2020), “Spillover of COVID-19: Impact on the global economy,” Available at SSRN 3562570.

Özoral, B. (2020), “Ortadoğu’da koronavirüs mücadelesinin politik ve ekonomik yansımalarının İran ve Körfez ülkeleri üzerinden değerlendirilmesi,” *İstanbul Ticaret Üniversitesi Sosyal Bilimler Dergisi*, 19(37), 1-13.

Rehman, A. A. (2010), *Gulf capital & Islamic finance: The rise of the new global players*, New York: McGraw-Hill.

Shanaev, S. and Ghimire, B. (2019), “Is all politics local? Regional political risk in Russia and the panel of stock returns,” *Journal of Behavioral and Experimental Finance*, 21, 70-82.

WHO. (2020), “Rolling updates on coronavirus disease (COVID-19)”, Available at: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/events-as-they-happen>

Zhang, D., Hu, M. and Ji, Q. (2020), “Financial markets under the global pandemic of COVID-19,” *Finance Research Letters*, 101528.

Appendix

Table A1: Descriptive Statistics

Country	Sector	Number of Companies	Number of Observations	Average Price	Average Market Capitalization
Bahrain	Services sector	6	1800	0.5165	62717.95
	Industrial sector	6	1800	0.274422	105841.7
	Financial sector	9	2700	0.325626	1131555.
Kuwait	Services sector	16	4800	0.683771	399761.3
	Industrial sector	14	4200	0.345010	92554.85
	Financial sector	23	6900	0.270578	716536.3
Oman	Services sector	13	3900	0.716410	63634.09
	Industrial sector	10	3000	0.255900	27408.16
	Financial sector	20	6000	0.155457	130627.5
Qatar	Services sector	10	3000	4.976360	7622477.
	Industrial sector	8	2400	2.51	31533556.7
	Financial sector	14	4200	4.7	19022084.4
Saudi Arabia	Services sector	35	10500	20.22	84248530.6
	Industrial sector	36	10800	23.6	555072
	Financial sector	24	7200	20.83446	24644876
UAE	Services sector	18	5400	5.52	25021630.07
	Industrial sector	8	2400	1.675613	1782938.
	Financial sector	25	7500	4.866521	13175166

Table A2: Correlation Matrix for the First Phase from 01-01-2020 to 30-07-2020

Country	Sector	Probability	Price	LogCases	LogCap
Bahrain	Services Sector	Price	1		
		LogCases	-0.09483***	1	
		LogCap	0.616981***	-0.220946***	1
	Industrial Sector	Price	1		
		LogCases	-0.06916**	1	
		LogCap	0.371456***	-0.010591	1
Kuwait	Financial Sector	Price	1		
		LogCases	-0.15576***	1	
		LogCap	0.540251***	-0.064848**	1
	Services Sector	Price	1		
		LogCases	-0.06025***	1	
		LogCap	0.41332***	-0.06219***	1
Oman	Industrial Sector	Price	1		
		LogCases	-0.07537***	1	
		LogCap	0.674851***	-0.056843***	1
	Financial Sector	Price	1		
		LogCases	-0.13094***	1	
		LogCap	0.714261***	-0.06637***	1
Oman	Services Sector	Price	1		
		LogCases	-0.09129***	1	
		LogCap	-0.30236***	-0.0649***	1
	Industrial Sector	Price	1		
		LogCases	-0.08499***	1	
		LogCap	0.571394***	-0.051622**	1
Financial Sector	Financial Sector	Price	1		
		LogCases	-0.11272***	1	
		LogCap	0.083903	-0.046727***	1

Country	Sector	Probability	Price	LogCases	LogCap
Qatar	Services Sector	Price	1		
		LogCases	-0.02919		1
		LogCap	0.581553***	-0.021952	1
	Industrial Sector	Price	1		
		LogCases	-0.04207		1
		LogCap	0.06359**	-0.0274	1
	Financial Sector	Price	1		
		LogCases	-0.04597**		1
		LogCap	0.654072	-0.021701	1
Saudi Arabia	Services Sector	Price	1		
		LogCases	-0.07583***		1
		LogCap	0.35859***	-0.04368***	1
	Industrial Sector	Price	1		
		LogCases	-0.06797***		1
		LogCap	0.227007***	-0.020573	1
	Financial Sector	Price	1		
		LogCases	-0.13028***		1
		LogCap	0.446126***	-0.023977	1
UAE	Services Sector	Price	1		
		LogCases	-0.0419**		1
		LogCap	0.706922***	-0.033415*	1
	Industrial Sector	Price	1		
		LogCases	-0.07738***		1
		LogCap	0.324607***	-0.051164*	1
	Financial Sector	Price	1		
		LogCases	-0.0299*		1
		LogCap	0.360411***	-0.048747***	1

Table A3: Correlation Matrix for the Second Phase from 01-08-2020 to 23-02-2021

Country	Sector	Probability	Price	LogCases	LogCap
Bahrain	Services Sector	Price	1		
		LogCases	0.015018	1	
		LogCap	0.665706***	0.00462	1
	Industrial Sector	Price	1		
		LogCases	0.098568***	1	
		LogCap	0.548379***	0.000858	1
Kuwait	Financial Sector	Price	1		
		LogCases	-0.00602	1	
		LogCap	0.62613***	0.004928	1
	Services Sector	Price	1		
		LogCases	0.001619	1	
		LogCap	0.40994***	0.03075	1
Oman	Industrial Sector	Price	1		
		LogCases	0.037102*	1	
		LogCap	0.700962***	0.046921**	1
	Financial Sector	Price	1		
		LogCases	0.045937***	1	
		LogCap	0.714032***	0.026351	1
Oman	Services Sector	Price	1		
		LogCases	-0.00388	1	
		LogCap	-0.26943***	-0.02094	1
	Industrial Sector	Price	1		
		LogCases	0.058088**	1	
		LogCap	0.560926***	0.030161	1
Oman	Financial Sector	Price	1		
		LogCases	-0.02926	1	
		LogCap	0.217795***	-0.03455*	1

Country	Sector	Probability	Price	LogCases	LogCap
Qatar	Services Sector	Price	1		
		LogCases	0.050925*	1	
	Industrial Sector	LogCap	0.544912***	0.046563*	1
		Price	1		
		LogCases	-0.03358	1	
		LogCap	-0.01797	-0.01294	1
Saudi Arabia	Financial Sector	Price	1		
		LogCases	0.030691	1	
	Services Sector	LogCap	0.601696***	0.022945	1
		Price	1		
		LogCases	0.081415***	1	
		LogCap	0.221087***	0.051589***	1
UAE	Industrial Sector	Price	1		
		LogCases	0.189953***	1	
	Financial Sector	LogCap	-0.00095	0.0904***	1
		Price	1		
		LogCases	0.092738***	1	
		LogCap	0.355119***	0.020744	1
UAE	Services Sector	Price	1		
		LogCases	0.050659***	1	
	Industrial Sector	LogCap	0.604481***	0.032079*	1
		Price	1		
		LogCases	0.113471***	1	
		LogCap	0.419318***	0.03705	1
UAE	Financial Sector	Price	1		
		LogCases	0.013242	1	
		LogCap	0.36375***	0.025519	1

Grouping Foreign Aid and the Multidimensional Poverty Index: A Cluster Analysis

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ABSTRACT

The paper deals with the effects of foreign aid on the changes in the Multidimensional Poverty Index over time. The goal is to group data on foreign aid (considered under a variety of measures and instruments), the MPI and changes on their headcount and their intensity components, and public expenditure on education and health, for a sample of 60 observations (50 countries) and the period 1999-2014. As information is only available as a cross-country section, the methodology used is a three steps cluster and discriminant analysis. In the first step, the cluster was carried out with six different sectorial foreign aid, closely linked to the ten MPI indicators. In a second step, the clusters were performed among the changes in the ten MPI indicators. In the third step, aid, MPI indicators and public expenditures on education and health were considered. The main results are three groups of countries in each step. Only few countries remain always in the same group. Although there is a remarkable heterogeneity across countries and groups among the aid types allocated on them, all countries belonging to the second group received a significant amount of aid.

ملخص

تتناول الورقة آثار المعونة الخارجية على التغيرات في مؤشر الفقر المتعدد الأبعاد على مر الزمن. ويتلخص الهدف في تجميع البيانات المتعلقة بالمعونة الأجنبية (التي يتم النظر إليها في إطار مجموعة متنوعة من التدابير والأدوات)، ومؤشر الفقر المتعدد الأبعاد، والتغيرات التي تطرأ على عناصره

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الرئيسية ومكونات كثافته، والإنفاق العام على التعليم والصحة، من أجل عينة تتكون من 60 ملاحظة (50 دولة) وعلى مدى فترة تمتد بين 1999 و 2014. وبما أن المعلومات متاحة فقط كفرع شامل لعدة بلدان، فإن المنهجية المستخدمة هي مجموعة الخطوات الثلاث والتحليل التمييزي. في الخطوة الأولى، نُفذت المجموعة بستة معونات خارجية قطاعية مختلفة، ترتبط ارتباطاً وثيقاً بالمؤشرات العشرة لمؤشرات الفقر متعدد الأبعاد. وفي خطوة ثانية، أُجريت المجموعات ضمن التغيرات التي طرأت على المؤشرات العشرة لمؤشرات الفقر متعدد الأبعاد. وفي الخطوة الثالثة، تم النظر في مسألة المعونة ومؤشرات الفقر متعدد الأبعاد والنفقات العامة على التعليم والصحة. والنتائج الرئيسية أفضت إلى ثلاث مجموعات من البلدان في كل خطوة. ولم يبق سوى عدد قليل من البلدان في نفس المجموعة. وعلى الرغم من وجود تباين ملحوظ بين البلدان والمجموعات من بين أنواع المعونة المخصصة لها، تلقت جميع البلدان المنتمية إلى المجموعة الثانية قدراً كبيراً من المعونة.

ABSTRAITE

L'article traite des effets de l'aide étrangère sur l'évolution de l'indice de pauvreté multidimensionnelle dans le temps. L'objectif est de regrouper les données sur l'aide étrangère (considérée sous une variété de mesures et d'instruments), l'IPM et les changements sur leur effectif et leurs composantes d'intensité, et les dépenses publiques d'éducation et de santé, pour un échantillon de 60 observations (50 pays) et la période 1999-2014. Comme l'information n'est disponible que sous forme de section transnationale, la méthodologie utilisée est une analyse en grappes et discriminante en trois étapes. Dans la première étape, le cluster a été réalisé avec six aides étrangères sectorielles différentes, étroitement liées aux dix indicateurs de l'IPM. Dans une deuxième étape, les clusters ont été réalisés parmi les changements des dix indicateurs de l'IPM. Dans la troisième étape, l'aide, les indicateurs de l'IPM et les dépenses publiques en matière d'éducation et de santé ont été considérés. Les principaux résultats sont trois groupes de pays dans chaque étape. Seuls quelques pays restent toujours dans le même groupe. Bien qu'il existe une hétérogénéité remarquable entre les pays et les groupes en ce qui concerne les types d'aide qui leur sont alloués, tous les pays appartenant au deuxième groupe ont reçu un montant d'aide significatif.

Keywords: Foreign Aid, Multidimensional Poverty Index, Cluster analysis

JEL Classification: F35, I32, C38

1. Introduction

Sustainable Development Goal 1 aims to end poverty in all its forms and dimensions (target 1.2). Poverty may be defined according to income but also under deprivations people face in their lives. The Multidimensional Poverty Index (MPI) is a synthetic index that scrutinizes personal deprivations across ten indicators in health (two indicators), education (two indicators) and standard of living (6 indicators). The sources used to compute MPI are national surveys (for instance Demographic and Health Surveys, Multiple Indicator Cluster Surveys or other). As every survey is conveyed in different years in different countries, there is no possibility to get an annual time series of MPI across countries, but it is possible to get different data points at different time period to perform a cross-country analysis.

The global MPI was launched in 2010 by the Oxford Poverty and Human Development Initiative (OPHI) at the University of Oxford and the UNDP for the Human Development Report. Figures are updated at least once a year using newly available surveys and data. In 2016, OPHI compiled up to 60 country cases and offered the changes in the MPI and its ten indicators for different time periods. Following the analysis made by Alkire, Roche and Vaz (2017) for 34 countries, Alkire et al. (2017) for 35 Sub-Saharan countries and Alkire et al. 2019 for ten countries, this paper tries to complement the analysis of the changes in multidimensional poverty across countries and to link them to Official Development Assistance (ODA) flows.

One of the main ODA purposes is to fight against poverty. Therefore, the aim of this paper is to analyze if ODA has incidence in poverty reduction when poverty is measured by a multidimensional method. As there is no time series for the evolution of multidimensional poverty, the methodology used in this paper is a cluster analysis. We perform groups of countries following three steps. In the first step, we consider MPI data and their ten indicators to get empirically the most accurate number of clusters (three). In the second step, we add the sectorial ODA data most closely related to each MPI indicator. We also get three clusters. In the third step we add the public expenditure in health and education (relative to each country GDP) to the MPI indicators and ODA sectors.

As far as we know this is the first time that a cluster analysis is used to analyze MPI and ODA flows. Our main findings are three heterogeneous clusters in each step. Neither geographical or income levels criteria explains the heterogeneity. There are some positive correlations among the ten indicators of the MPI. Electricity stands out among them, although it was the sector that received the lowest level of ODA. There is a positive trend (convergence) between MPI changes and the initial level of the MPI. These results are interesting for future ODA allocations and the measure of the progress of SDG 1.

The rest of the article is organized as flows. In section 2 we motivate the paper and show the connected literature. Section 3 explains data and methodology. Section 4 describes results and the theory of change that may be behind our normative interpretation. Section 5 concludes.

2. Linking MPI and ODA

In 2010, the United Nations Development Program's flagship publication Human Development Report offered a new set of development indicators. One of them was the Multidimensional Poverty Index, developed by Alkire and Foster (2011a).

Any index related to multidimensional poverty requires determining the unit of analysis (the household surveyed in the case of MPI), selecting the main deprivations to be considered (health, education and standard of living), identifying the set of indicators in which each person is deprived (two in the case of education and health and six for standard of living)⁴ at the same time and summarizing their poverty profile in a weighted deprivation score. Persons are identified as multidimensionally poor if their deprivation score exceeds a cross-dimensional poverty cutoff (33.3% for the equally weighted three dimensions)⁵. The proportion of

⁴ The indicators are: years of schooling and child school attendance (educational deprivations); child mortality and nutrition (healthy deprivation); access to electricity, improved sanitation and drinking water, flooring, cooking fuel and assets ownership (living standard deprivation). In the renewed version of MPI-2018 some changes in the definition of each indicator have been carried out. The details can be consulted in Alkire & Kanagaratnam (2018) and Alkire, Kanagaratnam & Suppa (2018).

⁵ Two additional cut-offs are considered in analytical studies: people who are deprived between 20%-33.3% are considered as "vulnerable to poverty" and those who are deprived in 50% or more of the dimensions are qualified as under "severe poverty".

poor people (H) and their average deprivation score (i.e. the ‘intensity’ of poverty or percentage of simultaneous deprivations they experience, A), become part of the final poverty measure ($H \cdot A$)⁶.

The methodological proposal for the elaboration of an MPI offered by Alkire & Foster (2011a, b) provides remarkable flexibility. Maintaining all the technical characteristics (axioms) and their capacity for decomposition under various criteria (spatial by region, urban-rural, by ethnic groups, by gender), the governments of each country can adapt this methodology to their own context and political priorities (Alkire et al. 2019b). Many governments in Latin America have done so⁷.

Notwithstanding, the MPI has received some criticism. For instance, Burchi et al. (2018, 2019) have proposed the Global Correlation Sensitive Poverty Index (G-CSPI), that incorporates employment as a poverty dimension instead standard of living, though maintaining education and health. Authors remark as an advantage over MPI that it is an individual rather than a household-level measure of poverty, which is crucial for gender-disaggregated analysis and horizontal inequalities. Moreover, they criticize the Alkire, Roche and Vaz’s (2017) article because sometimes there was not available information for some indicators in every country. Other drawbacks signaled by Burchi’s et al. such as that the MPI is insensitive to inequality among the poor or that its variation over time is, due to the dual cut-off method, almost entirely due to changes in the headcount ratio and only minimally due to changes in the poverty intensity have been contested by Alkire & Foster (2019) and Alkire et al. (2019a).

When the deprivation cut-offs in eight of the ten indicators reflect higher thresholds, the category of “destitution” is used (see Alkire, Conconi & Seth 2014).

⁶ A more formal explanations can be seen in Alkire & Santos (2014) and Alkire et al. (2015).

⁷ See, for instance, Government of Chile 2015. Government of Costa Rica 2015. Government of El Salvador 2015. Government of Honduras 2016, 2017. Government of Panama 2017. Government of the Dominican Republic 2017. There are methodological proposals for developed countries such as Alkire, Apablaza and Jung (2014) and Whelan et al (2014) for the countries of the European Union that produce a homogeneous survey; for five European countries (D'Ambrosio et al., 2011); for Spain (although focused on social welfare, rather than on poverty, de Argüeso et al., 2013); for Germany (Rippin 2016, Suppa 2016), and even for China (Wang et al 2016) OR Sierra Leone (OPHI & UNDP 2019b).

Ravallion (2011, 2012a) has remarked the discretionary equi-ponderation of the three dimensions of the MPI, qualifying the index as a “mashup index”. Ravallion proposes the use of a dashboard indexes to evaluate the trends of poverty, including the MPI and the monetary poverty index based on the USD 1.90 a day PPP 2011, as the World Bank is doing. OPHI and UNDP has accepted this view and the targets selected to monitor the SGD 1 included in the 2030 Agenda for Sustainable Development has recognized it. While Target 1.1 concentrates on the eradication of income poverty, Target 1.2 goes beyond the income dimension and calls for a reduction of “poverty in all its dimensions according to national definitions”.

In 2017, a 1.3 billion people were identified as multidimensionally poor across 101 countries (OPHI and UNDP 2019a). A massive variation in multidimensional poverty within countries was identified (for instance, poverty in Uganda’s provinces range from 6% to 96.3%) and a quick poverty reduction was pointed out for countries such as Cambodia or India (more than 700 million people were out of poverty for 2005/06-2015/16). A wide variation across countries was not only identified in the incidence⁸ but also in the intensity⁹ and the inequality¹⁰ of poverty experienced by each poor household. In 2017, the incidence of multidimensional poverty reached 23.1%, the intensity was 49.4% with a 10.5% of the population under severe poverty (that means a deprivation score of 50% or more) and 15.3% of population qualified as vulnerable to poverty (a deprivation score of 20-33%). Health deprivations contributed to poverty in 25.8%, whereas the contribution of education was 29.5% and standard of living 44.7%.

By regions, Sub-Saharan Africa was the region with highest incidence of multidimensional poverty (57.5%) followed by South Asia (31%), Arab

⁸ The incidence or poverty headcount is the population with a deprivation score of at least 33%, expressed as a share of the population in the survey year, the number of people in the survey year.

⁹ The intensity of multidimensional poverty is the average deprivation score experienced by people in multidimensional poverty. The MPI is the product of the incidence times intensity of multidimensional poverty.

¹⁰ Inequality among poor people is measured using the variance, which is calculated by subtracting each multidimensionally poor person’ deprivation score from the average intensity, squaring the difference, summing the squared differences, and dividing the sum by the number of multidimensionally poor people (OPHI-UNDP 2019:13; Alkire and Foster, 2019).

States (15.7%), Latin America and the Caribbean (7.5%), East Asia and the Pacific (5.6%) and Europe and Central Asia (1.1%). The intensity of deprivation remarkably shows less dispersion: the higher value was 54.9% in Sub-Saharan Africa and the minimum was 37.9% in Europe and Central Asia.

The 2030 Agenda for Sustainable Development (United Nations 2015) pointed out the relevance of Official Development Assistance (ODA) flows to reach the SDGs. Number 43 of the United Nations' declaration states:

An important use of international public finance, including official development assistance (ODA), is to catalyze additional resource mobilization from other sources, public and private. ODA providers reaffirm their respective commitments, including the commitment by many developed countries to achieve the target of 0.7% of gross national income for official development assistance (ODA/GNI) to developing countries and 0.15% to 0.2% of ODA/GNI to least developed countries.

ODA is defined as government aid designed to promote the economic development and welfare of developing countries. Aid may be provided bilaterally, from donor to recipient, or channeled through a multilateral development agency. Aid includes grants, "soft" loans (where the grant element is at least 25% of the total) and the provision of technical assistance. The OECD maintains a list of developing countries and territories; only aid to these countries counts as ODA. Although not every ODA disbursement has poverty reduction as its declared and main goal, most ODA flows might be considered as a financial contribution for poverty eradication¹¹. Furthermore, though ODA is not the highest financial flow to enhance economic development (it is private foreign direct investment but this flow is mainly focused in emerging countries), it is the main public (official) flow that has poverty eradication as its

¹¹ The Addis Ababa Action Agenda called for "strengthen international cooperation to support efforts to build capacity in developing countries, including through enhanced official development assistance (ODA)" to reach the sustainable development targets (United Nations 2015b; §22).

preferred purpose. This is the purpose of this paper. We want to know if ODA flows can be linked to MPI trends.

Related literature to this work is, on the one hand, Larrú (2017) who has offered a normative approach to link ODA and the MPI proposed by Santos & Villatoro (2018, 2019) for Latin American countries and, on the other hand, articles related to the analysis of the changes MPI over time such as Alkire, Roche and Vaz (2017) and Alkire et al (2019a).

The nature of data, gathered from different time periods, and scarcity of cases where the MPI was measured in the framework of ODA, inherently limits the scope of this study and forces to be selective with the appropriate methodology. In Section 3 it will be justified why not only we do not carry out a causal or regression analysis, but the reasons to select a cluster and discriminant analysis. It is important to bear in mind that the analysis has been done over discrete data points (changes in MPI and its ten components) and different time periods for each country due to the different years in which poverty surveys were conducted. This is the reason why poverty indexes and ODA flows are all annualized.

3. Data and Methodology

3.1. Data and correlations among variables

Our dataset for MPI comes from OPHI and the results for the “2016 Summer global MPI Resources” (Tables 6.1-6.6)¹². The dataset offers information for 60 cases and 50 countries¹³. From the dataset, we selected

¹² Data are available at <https://ophi.org.uk/2016-summer-global-mpi-resources/>

¹³ Country names are added with a period length. This period reflects the first and final year in which a survey was conducted. For example, Armenia 2005-2011 means that a DHS survey was carried out in 2005 and other in 2011. The dataset offers the annualized difference between these two years. Sometimes, there is more than one data point for a country, because it could be computed the changes for different time periods. For example, there are three observations for Nigeria: 2003-2008; 2008-2014; 2003-2013. The other cases are Senegal 2005-2012/14; 2010/11-2012/14; 2005-2010/12 (the dash bar means that the surveys were conducted under those years); Bangladesh 2004-2008; 2007-2012; The Republic of Congo 2005-2011/13; 2009-2011/13; Peru 2005-2009 and 2008-2013; Zimbabwe 2006-2010/12; 2010/11-2015. Alkire, Roche and Vaz (2017) followed the same criteria and used 37 observations for the sample of 34 countries.

these cross-section variables for the 60 available observations to maximize the sample size:

- MPI change in relative terms; this is the difference in levels across two periods as a percentage of the initial period;
- Headcount and intensity changes in relative terms;
- the change in the number of multidimensional poor;
- the annualized absolute change in raw headcounts (in percentage points) of the ten MPI indicators¹⁴.

Raw headcounts are the total proportion of the population who experience deprivations in each indicator. In other words, we have a [60x10] matrix (though there were 10 missing observations for nutrition and two for flooring and cooking fuel).

For the sake of completeness, all methods described below were carried out for two versions of the dataset. On one hand, the dataset was restricted to the 42 observations that had no missing values in any of the variables. On the other hand, the full dataset with N=60 was considered using the median for imputation of the missing values. The results in both cases were extremely similar so we just report the results obtained for the full sample hereafter.

In addition to the analysis of the MPI indicators, we wanted to know if some domestic resources could have an impact or influence in the selected countries and periods. We consider the public spending on education and health (relative to GDP) as relevant variables due to their link with the first two dimensions of the MPI. We extracted the values from World Bank's World Development Indicators and compute their average value for each country and time period.

Finally, data for ODA was extracted from OECD-DAC dataset. We computed the sum of Net ODA coming from "All donors" for each developing country of our sample. We use the Creditor Reporting System (CRS) dataset to match MPI-indicators with sectorial ODA. We considered ODA under gross disbursements, from 2002-2017 in current

¹⁴ See the footnote 1 for the 10 indicators.

prices (US Dollar millions) for data availability. We selected six sectorial ODA that are closely related to the ten MPI indicators: education, health, energy, electricity, water and sanitation, and “other”. The latter was computed as a “residual”. It was the result of the difference between “ODA total sectors” minus ODA for social sector, economic sector, production sector, debt relief and humanitarian aid.

Table 1 shows the main statistical indicators.

All the variables have 60 observations except for nutrition (50)¹⁵, floor and fuel (58)¹⁶ and public expenditure in education (55)¹⁷. All countries, except for Madagascar have achieved a negative MPI-change (reduction in multidimensional poverty)¹⁸. Poverty reduction was lower in nutrition (37 cases out of 50), cooking fuel (38 out of 58), flooring (44 out of 60) and water (46 out of 60) than in the rest on deprivations. Conversely, poverty increased in fuel (20 cases) and flooring and water (14 cases respectively). Means and median values show a higher poverty reduction in assets (-1.58%) and sanitation (-1.33%) than in fuel (-0.27%) and nutrition (-0.5%). The highest reduction happened in Rwanda 2005/2011 in sanitation (-7,38%) followed by The Republic of Congo 2005/2010 in assets (-6.51%). There was an increase of poverty in Sierra Leone in sanitation (+6.62%).

¹⁵ The missing values were Burundi, Core d’Ivoire, Guyana, Indonesia, Pakistan, Sao Tome and Principe, Tanzania, the Republic of Congo - in three cases.

¹⁶ The missing values were Central African Republic and South Africa for floor and Cote d’Ivoire and Egypt for fuel.

¹⁷ The missing values were Nigeria -in three cases- Jordan and Haiti.

¹⁸ Senegal 2010-2014 showed a 0.0% in her MPI-change, with +0.9% in the incidence of poverty and -0.9% in the intensity component.

Table 1: Main statistical indicators: components of the MPI (first panel) and the rest of the variables (second panel)

Name	Years of schooling	Child school attendance	Child mortality	Nutrition	Electricity	Improved sanitation	Drinking water	Flooring	Cooking fuel	Asset ownership
Mean	-0.74	-1.09	-0.98	-0.50	-0.96	-1.33	-0.91	-0.58	-0.27	-1.58
Median	-0.60	-0.90	-0.83	-0.46	-0.93	-1.10	-0.75	-0.53	-0.16	-1.28
Max	1.11	2.91	1.20	2.82	2.43	6.62	2.83	0.79	5.64	2.96
Min	-3.22	-5.46	-6.37	-2.77	-5.26	-7.38	-6.00	-3.84	-3.12	-6.51
Variance	0.62	2.02	1.39	0.95	1.29	4.33	2.71	0.65	1.47	3.14
St. deviation	0.79	1.42	1.18	0.97	1.14	2.08	1.65	0.81	1.21	1.77
C. Variation	-1.06	-1.30	-1.20	-1.95	-1.18	-1.56	-1.80	-1.40	-4.43	-1.12
Pov.reduction	52	50	53	37	52	52	46	44	38	52
Pov. Increase	8	9	7	13	8	8	14	14	20	8
Observations	60	60	60	50	60	60	60	58	58	60

Name	educ_Gov_exp	Health_public	ODA_educ	ODA_health	ODA_energy	ODA_electri	ODA_water_sanit	ODA_other	MPI_change	poor_change	Hcount_change	Intensity_change
Mean	4.06	10.24	79.41	82.66	36.53	10.61	40.16	157.22	-4.85	-341.34	-3.93	-0.95
Median	3.78	9.91	62.83	53.49	18.75	5.99	30.13	141.87	-4.04	-9.77	-3.00	-0.94
Max	11.07	17.72	342.93	347.93	296.51	61.50	145.23	682.68	2.30	11745.2	2.01	0.28
Min	1.43	4.31	4.37	2.75	0.05	0.00	0.99	4.66	-17.73	-26957.8	-17.60	-2.12
Variance	2.94	10.36	5519.69	7399.04	2394.26	181.51	1148.82	16586.27	13.80	23869671.10	12.97	0.31
St. Deviation	1.71	3.22	74.29	86.02	48.93	13.47	33.89	128.79	3.72	4885.66	3.60	0.56
CVariation	0.42	0.31	0.94	1.04	1.34	1.27	0.84	0.82	-0.77	-14.31	-0.92	-0.59
Pov.Reduc									58	31	57	58
Pov.increase									2	29	3	2
Observ	55	60	60	60	60	60	60	60	60	60	60	60

Source: Authors' elaboration.

There were 14 cases where the reduction of poverty happened in the ten MPI-indicators and 13 cases where the reduction occurred in 9 indicators. The minimum reduction happened in 4 cases where there was only a reduction in 4 indicators (Cote d'Ivoire 2005 - 2011/13; Madagascar 2004 - 2008/10; Senegal 2010/11 - 2012/14; Zimbabwe 2010/11 – 2015). Not every country shows a reduction in poverty under all its forms or dimensions. Even more, there is a remarkable heterogeneity among the results in the poverty indicators. Variance ranges from 4.33% (sanitation) and 3.14% (assets) to 0.62% (years of schooling) and 0.65 (flooring). Fuel shows the highest volatility when it is measured by the coefficient of variation (CV): +4.43% compared to years of schooling (-1.06%) that was the lowest.

Table 2 shows the country with the highest poverty reduction and the highest poverty increase for each poverty indicator.

Table 2. The highest poverty reduction and poverty increase in each MPI indicator

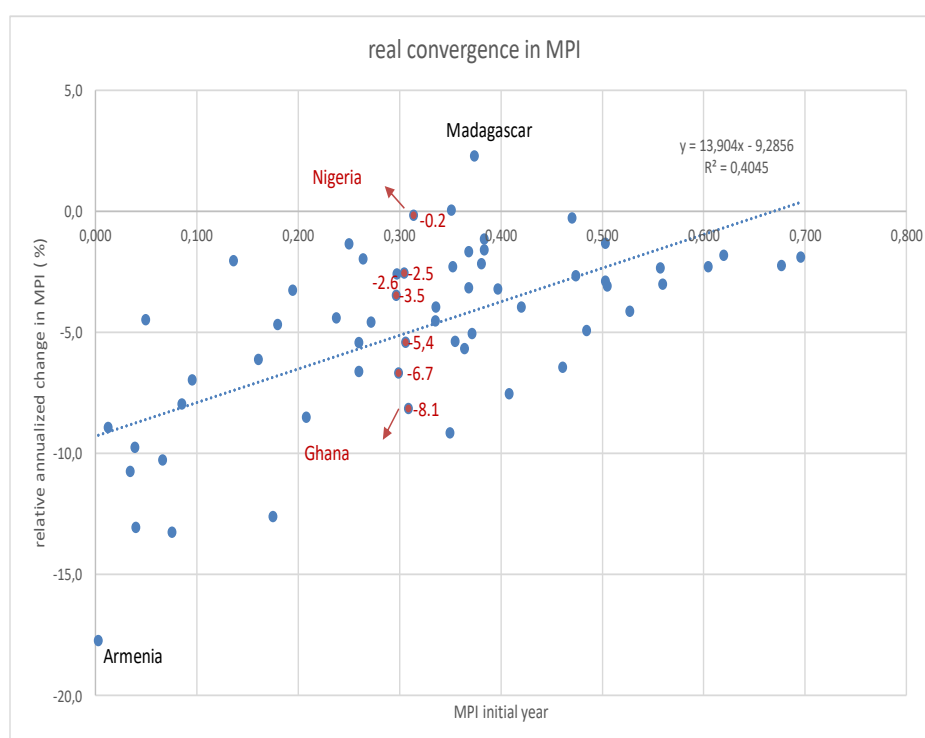
Country/case	Reduction value (%)	Indicator	Country/case	Increase value (%)
Burundi 2005/2011	-3.22	Years of schooling	Madagascar 2004/2010	+1.11
Liberia 2007/2014	-5.46	School attendance	Jordan 2007-2010	+2.91
D.R. Congo 2007/2013	-6.37	Child mortality	Sierra Leone 2008-2014	+1.2
South Africa 2008/2013	-2.77	Nutrition	Madagascar 2004-2010	+2.82
Nepal 2006/2012	-5.26	Electricity	Senegal 2010-2014	+2.43
Rwanda 2005/2011	-7.38	Sanitation	Sierra Leone 2008-2014	+6.62
Ethiopia 2000-2006	-6.00	Water	Senegal 2010-2014	+2.83
Senegal 2010-2014	-3.84	Flooring	D.R. Congo 2007/2013	+0.79
Indonesia 2007/2013	-3.12	Fuel	D.R. Congo 2007/2013	+5.64
Congo, the Rep. of 2005/2010	-6.51	Assets	Senegal 2010/2014	+2.96

Note: Column 3 (Indicator) is valid for the other left-hand and right-hand columns.

Source: Authors' elaboration.

MPI change shows a positive trend with the initial MPI value. The lower the initial MPI is, the higher change in MPI happens. Notwithstanding, Figure 1 shows the heterogeneity of the changes in MPI related to an initial MPI around 0.300. The cases ranges from -0.2% (Nigeria) to -8.1% (Ghana)¹⁹.

Figure 1: Correlation between initial MPI and relative annualized changes in MPI



Source: Authors' elaboration.

Regarding public expenditure in education and health relative to GDP, all countries have invested more in health than education. Health shows more variance but lower volatility than education. Lesotho 2004-2010 was the

¹⁹ Standard errors= 2.21 and t-stat=6.28. Regression includes a constant. Despite the positive trend the R² is only 40%. Ravallion (2012b) did not find poverty convergence using unidimensional monetary data. Regression of MPI change on the number of years for each country-period was only significant at 94% of confidence: the coefficient=0.44; se=0.23; t-stat=1.93; p-value=0.0589. R²=0.06.

case with the highest expenditure in education (11.07%) followed by Colombia (17.22%) and Malawi (17.11%) in health, whereas the lowest cases were Central African Republic 2000 – 2011 in education (1.43%) and Pakistan 2006-2014 in health (4.31%). The correlation between the two public expenditures is very low (0.1746; $R^2=0.0087$). Furthermore, there is no correlation between the sum of public expenditure in education and health and the change of MPI (-0.054; $R^2=0.0034$)²⁰.

A significant but low pair-wise Pearson correlation was found between *public expenditure in education* and school attendance (0.288*) and between *public expenditure in health* and child mortality (0.319*). *Total health expenditure* is also correlated with child mortality (0.322*), public expenditure in education (0.338*) and public expenditure in health (0.547**).

Regarding ODA measures, some bilateral correlations between variables are interesting enough. For instance, total expenditure in health (public and private, relative to GDP) is statistically significantly correlated with the six sectorial types: -0.387* with ODA-education; -0.458** with ODA-health; -0.385** with ODA-energy; -0.369** with ODA-electricity; -0.298* with ODA-water; -0.268* ODA-other²¹. We interpret these results as a substitution effect or fungibility of ODA. While donors finance a variety of public services, partner countries (recipients) may allocate less resources to public health.

All ODA types are correlated to each other. The highest coefficients are 0.798** between ODA-education and ODA-energy; 0.770** between ODA-energy and ODA-other. The lowest coefficients are between ODA-energy and ODA-electricity (0.479**); and ODA-energy and ODA-health (0.566**). Table 3 shows the correlation matrix among sectorial ODA variables.

²⁰ See Figure A.1 in the Annex.

²¹ There are significant correlations between total health expenditure and the other measures of ODA: total ODA gross, total ODA net, ODA loans, ODA grants, Multilateral ODA, CPA, ODA social, economic, production, debt and humanitarian aid. Values ranges from -0.452** (ODA loans) to -0.271* (ODA debt). Significant correlations remain between public expenditure in health (relative to GDP) and ODA-education (-0.330*), ODA-health (-0.377**) and ODA-energy (-0.385**) and the other total measures of ODA: gross, net, loans, multilateral, CPA, humanitarian and ODA-economic. All values are available to readers upon request.

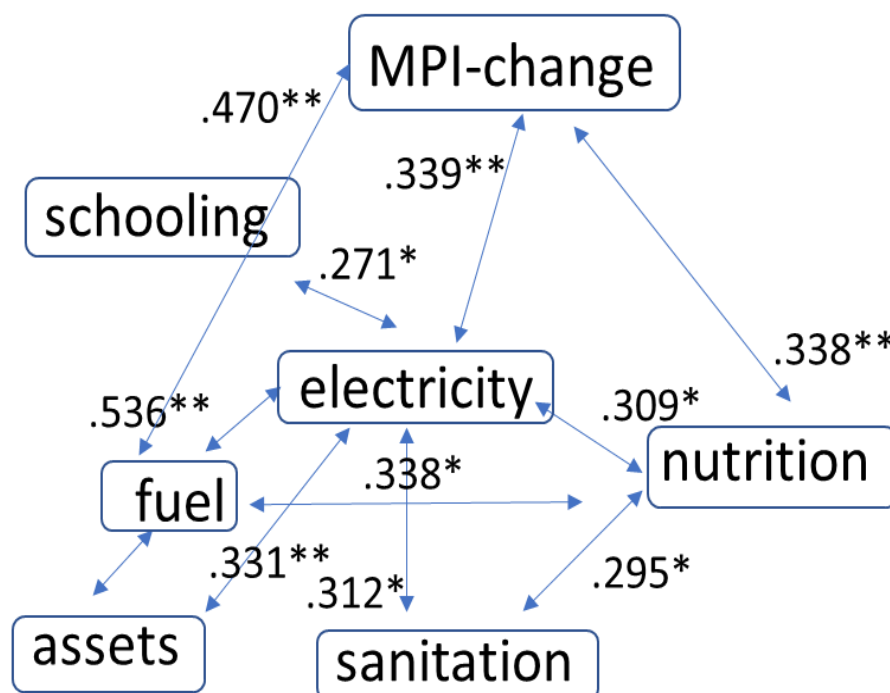
Table 3: Correlation matrix among sectorial ODA variables.

	ODA- education	ODA- health	ODA- energy	ODA- electricity	ODA- water&santitati on	ODA- other
ODA-education	1					
ODA-health	.581**	1				
ODA-energy	.787**	.527**	1			
ODA- electricity	.632**	.653**	.492**	1		
ODA- water&santitati on	.593**	.607**	.613**	.584**	1	
ODA-other	.745**	.508**	.755**	.523**	.701**	1

Note: ** stands for 99% of confidence. Source: Authors' calculations.

There are also interesting correlations among the ten MPI indicators and with MPI-change (Figure 2). As it can be seen, electricity is the MPI indicator that is more correlated with the other deprivations. We may infer that, due to higher spillover effects, donor might consider enhancing investment in ODA for electricity.

In a nutshell, we focus our analysis in the changes of the ten indicators that make up the MPI and six sectorial ODAs that are closely related to the MPI components. We also take into account the public expenditure and education and health relative to GDP. All data are annualized.

Figure 2: Correlations between MPI components

Note: ** stands for statistically significant at 99% of confidence and * at 95%. Each Pearson correlation was computed using the available data for each variable. The number of observations varies between each pair. For sensitivity analysis, results for a sample including imputed values (N=60) and for a restricted sample (N=42) with no missing value, see Figure A.2. in the Annex.

Source: Authors' calculations.

3.2. Methodology

In order to go beyond descriptive statistics, both supervised and unsupervised analyses were conducted in R, with very different performance in each case²².

Several supervised learning methods were used in order to assess whether the MPI-change could be predicted by means of the six ODA variables and also whether MPI-change could be predicted in terms of health

²² R 3.6.1 was used under the frontend RStudio 1.2.5001.

expenditure and education expenditure. The results were no good in both cases for any of the methods that were implemented²³. For each of them, several configurations of parameters were tried and the performance of each of those cases was evaluated by 100 iterations of Monte Carlo cross validation²⁴ obtaining a median R^2 always below 0.25 (Figure A.3. in the Annex). Given the different nature of the techniques, the result strongly suggests that prediction of MPI-change is not viable by means of ODAs, health expenditure or education expenditure.

Furthermore, regressions on each of the MPI indicators were also run to see if any of the indicators does have a relation with the ODAs (although a description of the whole MPI-change was not possible) with an equally discouraging result.

Since no reliable prediction seems possible, unsupervised learning was carried out in order to extract groups of similar countries and therefore deepen the insight on the topic. Again, several methods and configurations were implemented although this time with excellent results. Three different problems were studied; clustering the countries in terms of their similarity considering only MPI indicators, clustering the countries in terms of ODAs and finally clustering the countries considering both MPI indicators and ODAs.

When clustering, there are three main choices to make; firstly, the distance to create the dissimilarity matrix (and/or an appropriate method for reduction of dimensionality), secondly, what clustering method to select and finally the number of clusters to select. Of course, all the above should be considered altogether in order to explore all possible

²³ The full list of implemented methods is: Linear Model, k-Nearest Neighbors, 3-layer Neural Networks (using `neuralnet` package), Least Angle Regression (using `lars` package), Polynomial Kernel Regularized Least Squares (using `KRLS` package), Lasso Regression and Ridge Regression (using `elasticnet` package), CART (using `rpart` package), bagged CART (using `e1071` package), Boosted Generalized Additive Model (using `mboost` package), eXtreme Gradient Boosting (using `xgboost` package), L2 Regularized Support Vector Machine with Linear Kernel (using `LiblineaR` package), Multi-Layer Perceptron (using `RSNNS` package) and Random Forests (using `randomForest` package).

²⁴ The cross-validation was implemented with the `caret` package using `train()` with the `train control` `trainControl(method="LGOCV", number=100, p=0.8)`.

combinations. The best dissimilarity matrix for all the three cases²⁵ was found with the KODAMA algorithm²⁶ using k-Nearest Neighbors with k=2.

In all three cases, Agnes clustering (Hierarchical clustering with Ward D2 linkages) was selected to carry out the studies with three clusters, although several others were implemented. The selection of clustering algorithm and optimal number of clusters was done attending to internal measures (to check that inside a group observations are close to each other and to check that groups are well separated) and stability measures²⁷ (to check the consistency and the robustness of the results, that is, checking whether observations are classified in the same groups even if a variable is removed). Agnes was typically the choice with a best trade-off of all measures although in many cases other methods performed similarly²⁸, even finding exactly the same clusters in some case (this is a great and uncommon sign of robustness, as two different techniques arrive to the same result). Finally, in very few cases a different clustering might arguably be better attending to one or some of the specific measures, but we stick to Agnes with three groups so that the results can be compared with significance and no extra inconsistencies that could arise from comparing different methods are introduced.

4. Cluster and discriminant analysis: results

As a first approach, we tried to verify if cross-country regression analysis offers some statistically significant results. As explained above, no

²⁵ For each problem of clustering, Euclidean, Chevyshev, Manhattan, Canberra and Mahalanobis distances were tried using the *base* and *philentropy* packages as well as PCA, KODAMA, ISOMAP and Shannon nonlinear mapping for dimensionality reduction. The best dissimilarity matrix was selected using the Hopkins statistic (clusterend package).

²⁶ The KODAMA algorithm is a novel learning algorithm for unsupervised feature extraction, is specifically designed for analyzing noisy and high-dimensional datasets. KODAMA works in a similar fashion to algorithms such as t-SNE, Shannon Nonlinear Mapping or ISOMAP, reducing the dimensionality of the dataset in a nonlinear way such that meaningful groups are identified.

²⁷ The internal methods are the silhouette width, connectivity and Dunn index whereas the stability methods are APN, AD and ADM indexes. All were implemented using *clValid*.

²⁸ In addition to Agnes, Hierarchical clustering with other linkages, Kmeans Clustering, Diana Clustering, Model Based Clustering and Self Organizing Tree Algorithms were computed using the *factoextra* package.

method provided a significant model to associate MPI indicators and ODA variables²⁹. We cannot attribute any causal relationship among MPI changes and ODAs. It should be noted that the sum of the six sectorial ODAs are only capturing an average of 36% of all gross ODA resources³⁰. This implies that, besides our omitted variables problem for modeling changes in MPI, we are only considering a low proportion of the potential effect of the whole ODA flows. Moreover, the median value for the components of gross ODA are 7% for education, 6% for health and 21% for assets³¹. Even among all the ODA purposes (or sectors), very little resources are being committing for the components of MPI.

4.1. Cluster analysis

Then, instead of modeling MPI changes we look for groups of countries that share a profile regarding MPI components or sectors of ODA. A cluster analysis is the correct methodology to achieve this goal. As it was explained above, the clustering was conducted in three steps, firstly we made a cluster classification for the six sectorial measures of ODA. Secondly, we clustered the 10 MPI components. Thirdly, we carried out a cluster with ODAs, MPIs components and public expenditures in education and health. The results can be seen in Figures 3. 4 and 5.

²⁹ For instance, the result when we regress the six sectorial ODAs, and education and health as a share of GDP on MPI-change was that only ODAs for education and for energy were statistically significant (at 95%) with and Adjusted $R^2=0.0928$. The coefficient for ODA-education was 0.0034 (se=0.0015; p-value=0.0265) and for ODA-energy was -0.004 (se=0.0023; p-value=0.067).

³⁰ The values range from 55% of Indonesia and Jordan to 9% of Nigeria 2003-2008 and 16% of Guyana.

³¹ The maximum values range from 21.4% in education (Gabon 2000-2013); 20.5% in health (Nigeria 2008 – 2014); and 49.1% in assets (Mauritania 2007-2012).

Figure 3: Cluster amongst the six sectorial ODA.

Source: Authors' elaboration.

Figure 3 shows the three groups when the six sectorial ODAs are used. It can be seen that there is not a continental pattern (there are countries from Africa, Asia and America in all groups). Cluster 1 (displayed in red) is the most numerous with 35 cases (58% of the whole sample). The ten cases of cluster 2 (green) showed higher values than the averages in all the ODA measures. In fact, the ten cases belong to the first quartile when the six sectorial ODAs are ranked. Cluster 3 (blue) is made up of 15 cases (25% of the sample).

When the ten indicators of the MPI are used, the three groups showed in Figure 4 are identified.

30 cases (50%) are clustered around cluster one. Madagascar, who is the only case where there was a positive MPI change (higher poverty) is classified in this first group. Cluster 2 is solely made up of five

observations featuring four countries: Bangladesh, Senegal, Nepal and Rwanda. The remainder 25 cases (42%) are grouped in cluster 3.

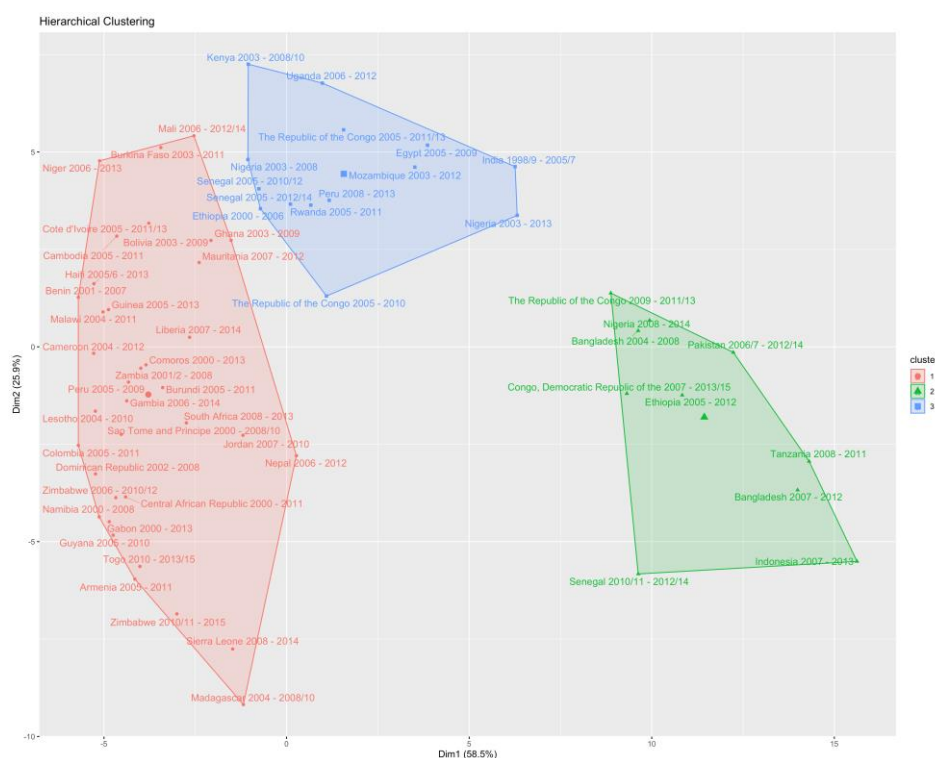
Figure 4: Cluster amongst 10 MPI indicators



Source: Authors' elaboration.

The cluster analysis still offers three groups when public expenditures in education and health are added to the six ODAs measures and the 10 MPI indicators (Figure 5). This time, the groups are more diversified. Cluster 1 in red features 36 cases (60% of the sample). Distances between them are large. The opposite happens between the ten cases (17%) of cluster 2. The remainder 14 cases (23%) are grouped in cluster 3.

Figure 5: Cluster with ODA, MPI indicators and education and health expenditures



Source: Authors' elaboration.

In all cases, we identified three clusters as the benchmark results. There is a noticeable heterogeneity within and between clusters³². We interpret this result as a confirmation that there is no blueprint for poverty reduction.

We also identify some countries that remain in the same cluster in the three groupings. Fifteen cases remain in the first group: Armenia, Cameroon, Colombia, Cote d'Ivoire, Dominican Republic, Gabon, Guyana, Lesotho, Madagascar, Namibia, Peru 2005-2009. Sao Tome and Principe, Togo and Zimbabwe (in the two cases).

³² See Table A.1. in the Annex for the classification of each country in each of the three steps.

Only Bangladesh (in the two periods) remains in the second group and Mozambique in the third group, remains in the same group in the three steps.

There are 15 cases that are grouped in the first cluster when ODA and all indicators are used, and they shifted to the third group when MPIs are included (Table 4)³³.

Table 4: Countries classified in cluster 1 under ODAs, cluster 3 under MPI indicators and cluster 1 when education and health public expenditures are added

Benin 2001 - 2007
Burundi 2005 - 2011
Cambodia 2005 - 2011
Central African Republic 2000 - 2011
Comoros 2000 - 2013
Gambia 2006 - 2014
Guinea 2005 - 2013
Haiti 2005/6 - 2013
Liberia 2007 - 2014
Malawi 2004 - 2011
Mauritania 2007 - 2012
Niger 2006 - 2013
Sierra Leone 2008 - 2014
South Africa 2008 - 2013
Zambia 2001/2 - 2008

Source: Authors' elaboration.

³³ See Table A.2. for all the sequenced cases.

4.2. Discriminant analysis

The results obtained in the Cluster Analysis are statistically significant, yet they act as a black box. In order to have further understanding of the underlying reality, a linear discriminant analysis using the group number as response is proposed to estimate a model that classifies countries according to their features. This analysis offers a classification function that would allow estimating the membership group of countries not studied yet.

Variables used as predictors in the discriminant function were selected from variables rejected from the ANOVA test (Table 5) and, therefore, they show higher discriminant power among data.

Table 5: ANOVA test

	Wilks' Lambda	F	gl1	gl2	Sig.
Yearsofschooling	.978	.640	2	57	.531
Childschoolattendance	.992	.234	2	57	.792
Childmortality	.825	6.053	2	57	.004
Nutrition	.991	.259	2	57	.773
Electricity	.995	.152	2	57	.859
Improvedsanitation	.915	2.659	2	57	.079
Drinkingwater	.959	1.233	2	57	.299
Flooring	.976	.690	2	57	.506
Cookingfuel	.830	5.829	2	57	.005
Assetownership	.957	1.267	2	57	.289
educ_Gov_exp	.927	2.229	2	57	.117
Health_public	.821	6.232	2	57	.004
EducHealth	.741	9.949	2	57	.000
ODA_educ	.420	39.319	2	57	.000
ODA_health	.352	52.563	2	57	.000
ODA_energy	.423	38.917	2	57	.000
ODAElectri	.437	36.665	2	57	.000
ODAwater_sanit	.566	21.852	2	57	.000
ODA_other	.554	22.981	2	57	.000

Source: Authors' elaboration.

The structure matrix (Table 6) shows the low correlation between *Health_public* and *Improved_sanitation* with discriminant functions and thus, both variables are omitted in the estimation of the classification functions.

Table 6: Structure matrix

	Function	
	1	2
ODA_health	.507*	.063
ODA_educ	.438*	.135
ODA_energy	.434*	-.165
ODAElectri	.424*	-.072
ODAwater_sanit	.317*	.295
Health_public	-.172*	.119
Cookingfuel	.013	.595*
ODA_other	.319	.372*
EducHealth	-.205	.287*
Childmortality	-.160	-.223*
Improvedsanitation	-.109	.117*

Source: Authors' elaboration.

From the coefficients of the classification function (Table 7), Fisher's linear discriminant functions are obtained, which allow to estimate the membership group of a new country and thus we can identify its profile.

Table 7: Classification function coefficients

	Fisher discriminant lineal functions		
	I	II	III
X ₁ : Childmortality	-1.364	-1.839	-1.893
X ₂ : Cookingfuel	-.645	1.467	1.052
X ₃ : EducHealth	1.553	1.373	1.521
X ₄ : ODA_educ	.041	.055	.055
X ₅ : ODA_health	.032	.112	.060
X ₆ : ODA_energy	.039	.212	.064
X ₇ : ODAelectri	-.054	.338	.014
X ₈ : ODAwater_sanit	-.016	-.030	.00034
X ₉ : ODA_other	-.022	-.035	-.014
(Constant)	-12.952	-36.050	-20.660

Source: Authors' elaboration.

The estimated model is validated by means of Leave One Out Cross Validation, obtaining a mean prediction accuracy of 88.3% (Table 8). This result is excellent as groups that were created using nonlinear nonconvex methods are being identified with a linear classifier.

Table 8: Confusion Matrix

		True class			Total
		1	2	3	
Predicted class	1	37	0	0	37
	2	1	11	1	13
	3	3	2	5	10
Sensitivity and Specificity	1	100%	0%	0%	100%
	2	7,7%	84,6	7,7	100%
	3	30%	20%	50%	100%

Source: Authors' elaboration.

The equations related to the Fisher discriminant lineal functions are:

$$F_{I,i} = -1.364X_{1,i} - 6.45X_{2,i} + 1.553X_{3,i} + 0.041X_{4,i} + 0.032X_{5,i} \\ + 0.039X_{6,i} - 0.054X_{7,i} - 0.016X_{8,i} - 0.022X_{9,i} \\ - 12.952$$

$$F_{II,i} = -1.839X_{1,i} + 1.467X_{2,i} + 1.373X_{3,i} + 0.055X_{4,i} + 0.112X_{5,i} \\ + 0.212X_{6,i} + 0.338X_{7,i} - 0.030X_{8,i} - 0.035X_{9,i} \\ - 36.050$$

$$F_{III,i} = -1.893X_{1,i} + 1.052X_{2,i} + 1.521X_{3,i} + 0.055X_{4,i} + 0.060X_{5,i} \\ + 0.064X_{6,i} + 0.014X_{7,i} + 0.00034X_{8,i} - 0.014X_{9,i} \\ - 20.660$$

Where:

$F_{g,i}$ discriminant score of individual i , in the group $g= I, II, III$

$X_{j,i}$ is the value of individual i in the observed variable X_j , $j=1, 2, \dots, 9$

New individuals (countries) will be classified in the group for which the classification function has a higher value, that is:

$$\text{If } F_{G,i} = \max_{g=I,II,III} F_{g,i} \text{ then individual } i \text{ belongs to group } G.$$

4.3. Discussion and implications

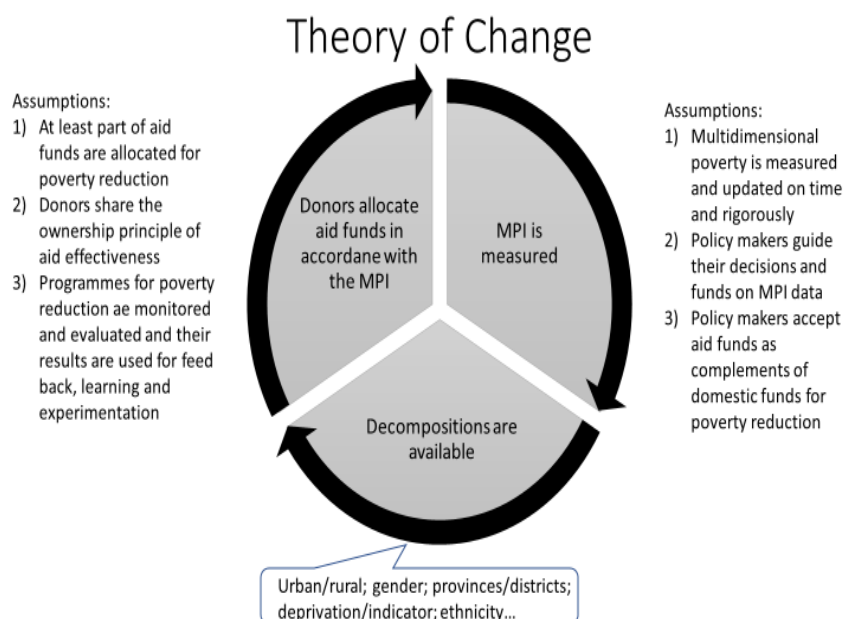
The applications of these groupings may be broad. For instance, policy makers of donor countries might plan and allocate their ODA resources taken into account the three clusters. It is remarkable that neither the income level (low, lower-middle or upper-middle income) nor the geographic criteria match exactly with the countries grouped in the three ODAs clusters. Indeed, it can be observed that in all three clusters there are Least Developing countries, Low-Income countries and Middle-Income countries. Similarly, all clusters feature Asian and Sub-Saharan countries.

Secondly, the clusters formed with the MPI indicators, show that a same country may be grouped in different clusters in different periods. For example, Senegal was grouped in the cluster number three in 2005-2010/12 and 2005-2012/14 but in the cluster number two for 2010/11-2012/14. Peru was classified in the third cluster for 2008-2013 but in the first one for 2005-2009. That means that there is no blueprint for poverty eradication. This can also be noticed by the greater amplitude (distances among countries) of cluster one. Countries grouped in the same cluster might compare the anti-poverty policies that each one has implemented and learn from each other.

Finally, these traits are also confirmed in our third step, when public expenditure in education and health are incorporated. Senegal is classified in cluster 3 for 2005-2012 but in the second one for 2010-2012/14. All clusters show countries for different continents and for different income levels.

Whatever the clustering results are, our main practical interest is to reinforce that ODA and MPI may be linked. Ownership has been identified as one of the main criteria for the effectiveness of foreign aid, at least since the OECD's Paris Declaration in 2005. At the base of our normative approach to link ODA and MPI, lies a theory of change that can be seen in the Figure 6.

Figure 6: Theory of the change that underlies the relationship between ODA and MPI



Source: Authors' elaboration.

In short, we are assuming that, at least, some proportion of aid is really and directly oriented to multidimensional poverty reduction and that aid donors and their partners take the information provided by the MPI indicators as a starting and critical point for the anti-poverty policies, including the international development cooperation. The capacity of the MPI to disaggregate the deprivations by gender, ethnicity, subregion or districts, urban or rural and so on, can be a very useful input when donors and recipients' countries plan their ODA sectoral projects and programs. Aid resources might be allocated in line with the country needs and under each province, gender, vulnerable group or indicator of the MPI has been identified. Furthermore, this approach may be extended and applied to different forms and designs of MPI. For instance, there are a variety of MPIs in Latin American countries (Santos and Villatoro 2018, 2020) or versions of the MPI for European or other countries³⁴.

³⁴ See the footnote 4 for some references.

To our knowledge, currently this is not the usual way to proceed in international development cooperation policy. Walking in this direction might accelerate the achievement of the SDG 1.

5. Conclusion

The goal of this paper is linking ODA and MPI changes. Data availability prevented a causal or complex econometric analysis such as regressions with dynamic panel data, nonetheless rigorous cluster analysis has been carried out to identify common patterns in MPI changes. It must be beard in mind that results are biased by the country sample and cases with available data and no causal inference should be inferred from the evidence show in the study. Notwithstanding, some interesting results have been got and they might be useful for policy makers.

There is a positive trend (convergence) between MPI changes and the initial level of the MPI. The higher the initial MPI is, the higher change in MPI happens. This should be taken into account when the progress in SDG 1 is assessed.

Regarding the changes in the ten indicators of the MPI, electricity has shown the highest correlations with the other MPI indicators. Although electricity was not the indicator that showed the greatest positive change in multidimensional poverty, it was positively correlated with nutrition, sanitation, fuel, assets, schooling and with the change of MPI, though their levels are 0.47 or lower. This may be taken into account by ODA donors because electricity was the sector that received the least sectorial ODA resources (on average, USD10.6 million that means near 1% of the average total net ODA considered in this paper). This claim may be reinforced with the positive correlations showed among ODA for electricity and the other considered sectorial ODA. On average, only 36% of the gross ODA was allocated to the sectors directly related to the MPI components.

Regarding education and health expenditures, it seems that their effect on changes in the MPI is low. We do not identify any statistically significant correlation between these expenditures and MPI indicators or sectorial ODAs.

When a cluster analysis is considered, three heterogeneous groups are identified under the three steps carried out. Neither geographical nor income level criteria explain the cluster compositions. We interpret this result as there is no single way to reduce multidimensional poverty using ODA flows. But donors (public and private) may consider our results as a guide for planning future ODA resources and for promoting evaluations that take the clusters shown here as a base line. More concrete projects and programmes evaluations are needed if the causal effects of ODA resources on multidimensional poverty want to be identified. But a first step in this analysis should be reckoning that only a very low share of ODA flows have been allocated considering the information reported by the MPI indexes and indicators.

References

- Alkire, S. and Foster, J. (2011a), "Counting and Multidimensional Poverty Measurement", *Journal of Public Economics*, 95 (7-8), 476-487.
- Alkire, S. and Foster, J. (2019), 'The role of inequality in poverty measurement', OPHI Working Paper 126, University of Oxford.
- Alkire, S. and Foster, J. E. (2011b), "Understandings and misunderstandings of multidimensional poverty measurement", *Journal of Economic Inequality*, 9(2), 289-314.
- Alkire, S. and Kanagaratnam, U. (2018), 'Multidimensional Poverty Index - Winter 2017-18: Brief methodological note and results'. OPHI MPI Methodological Notes No. 45, Oxford Poverty and Human Development Initiative, University of Oxford
- Alkire, S. and Santos, M.E. (2014), "Measuring Acute Poverty in the developing World: Robustness and Scope of the Multidimensional Poverty Index", *World Development*, 59, 251-274.
- Alkire, S., Apablaza, M., and Jung, E. (2014), "Multidimensional Poverty Measurement for EU-SILC Countries", OPHI Research in Progress 36b.
- Alkire, S., Conconi, A. and Seth, S. (2014), "Multidimensional Destitution: An Ordinal Counting Methodology for Constructing Linked Subsets of the Poor", OPHI Research in Progress 42a, Oxford Poverty and Human Development Initiative, University of Oxford.
- Alkire, S., Conconi, A., Pinilla-Roncancio, M., and Vaz, A. (2019b), "How to Build a National Multidimensional Poverty Index (MPI): Using the MPI to inform the SDGs". United Nations Development Programme (UNDP) and Oxford Poverty and Human Development Initiative (OPHI), University of Oxford, Oxford.
- Alkire, S., Foster, J. E., Seth, S., Santos, M. E., Roche, J. M., and Ballon, P. (2015), *Multidimensional Poverty Measurement and Analysis*, Oxford: Oxford University Press.
- Alkire, S., Jindra, Ch., Robles-Aguilar, G. and Vaz, A. (2017), "Multidimensional Poverty Reduction Among Countries in Sub-Saharan Africa", *Forum for Social Economics*, 46(2), 178-191.
- Alkire, S., Kanagaratnam, U. and Suppa, N. (2018), "The Global Multidimensional Poverty Index (MPI): 2018 revision", OPHI MPI

Methodological Notes 46, Oxford Poverty and Human Development Initiative, University of Oxford.

Alkire, S., Kovesdi, F., Mitchell, C., Pinilla-Roncancio, M., and Scharlin-Pettee, S. (2019a), “Changes over time in the global Multidimensional Poverty Index: A ten-country study”, OPHI MPI Methodological Note 48, Oxford Poverty and Human Development Initiative, University of Oxford.

Alkire, S., Roche, J. M. and Vaz, A. (2017), “Changes Over Time in Multidimensional Poverty: Methodology and Results for 34 countries”, *World Development*, 94, 232-249.

Argüeso, A.; Escudero, T.; Méndez, J.M. and Izquierdo, M.J. (2013), “Alternativas en la construcción de un indicador multidimensional de calidad de vida”, INE Documentos De Trabajo 01/2013.

D’Ambrosio, C., Deutsch, J. and Silber, J. (2011), “Multidimensional Approaches to Poverty Measurement: An Empirical Analysis of Poverty in Belgium, France, Germany, Italy and Spain, based on the European Panel”, *Applied Economics*, 43, 951-961.

Government of Chile (2015), Nueva Metodología de Medición de Pobreza por Ingresos y Multidimensional, Documentos Metodológicos 28, Santiago, 26 Enero.

Government of Costa Rica (2015) Índice de Pobreza Multidimensional (IPM). Metodología. INEC. San José. Octubre.

Government of El Salvador (2015), Medición Multidimensional de la Pobreza, El Salvador. San Salvador: Secretaría Técnica y de Planificación de la Presidencia y Ministerio de Economía, Dirección General de Estadística y Censos.

Government of Honduras (2016), Medición Multidimensional de la Pobreza (2016). Honduras. Tegucigalpa: Secretaría de Coordinación General de Gobierno y El Instituto Nacional de Estadística.

Government of Honduras (2017), Reducción de la pobreza multidimensional en la era de los ODS. <http://www.scgg.gob.hn/ipm/> (Accessed on 17.10.2017)

Government of Panamá (2017), Índice de Pobreza Multidimensional de Panamá: Año 2017. Ministerio de Economía y Finanzas. Ministerio de Desarrollo Social. Instituto Nacional de Estadística y Censo.

Government of Dominican Republic (2017), IPM-RD. Índice de Pobreza Multidimensional de la República Dominicana. Vicepresidencia de la República Dominicana. Junio. <http://www.siuben.gob.do/ipm/>

Larrú, J.M. (2017), "Linking ODA to the MPI: A Proposal for Latin America", *Global Economy Journal*, 17(3), DOI: <https://doi.org/10.1515/gej-2017-0041>.

OPHI and UNDP (2019), *Global Multidimensional Poverty Index 2019. Illuminating inequalities*. Oxford Poverty and Human Development Initiative and United Nations Development Programme. Oxford.

Ravallion, M. (2011), "On Multidimensional Indices of Poverty", World Bank Policy Research Working Paper 5580.

Ravallion, M. (2012), "Mashup Indices of Development", *World Bank Research Observer*, 27(1), 1-32.

Rippin, N. (2016), "Multidimensional Poverty in Germany: A Capability Approach", *Forum for Social Economics*, 45(2-3), 230-255.

Santos, M.E. and Villatoro, P. (2018), "A Multidimensional Poverty Index for Latin America", *Review of Income and Wealth*, 64(1), 52-82.

Santos, M.E. and Villatoro, P. (2020), "The Importance of Reliability in the Multidimensional Poverty Index for Latin America (MPI-LA)", *The Journal of Development Studies*, 56(9), 1784-1789.

Suppa, N. (2016), "Comparing monetary and multidimensional poverty in Germany." OPHI Working Paper 103. University of Oxford.

United Nations (2015), *Transforming our World. The 2030 Agenda for Sustainable Development*. United Nations. New York. A/RES/70/1.

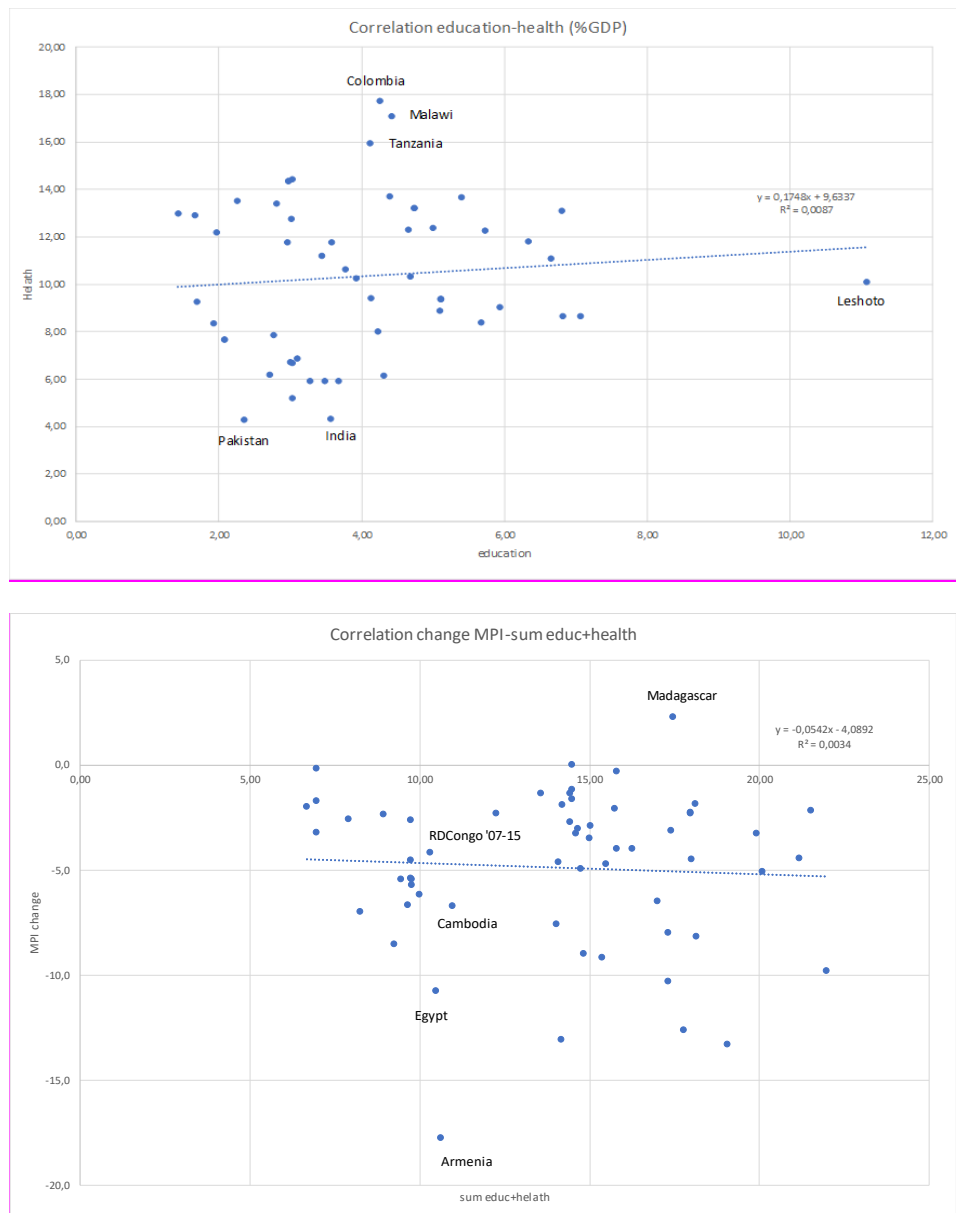
United Nations (2015b), *Addis Ababa Action Agenda of the Third International Conference on Financing Development*. United Nations. New York. Resolution 69/313 of 27 July.

Wang, X., Feng, H., Xia, Q., and Alkire, S. (2016), "On the relationship between Income Poverty and Multidimensional Poverty in China." OPHI Working Paper 101, University of Oxford.

Whelan, Ch., Nolan, B. and Maitre, B. (2014), "Multidimensional Poverty Measurement in Europe: An Application of the Adjusted Headcount Approach", *Journal of European Social Policy*, 24(2), 183-197.

ANNEXES

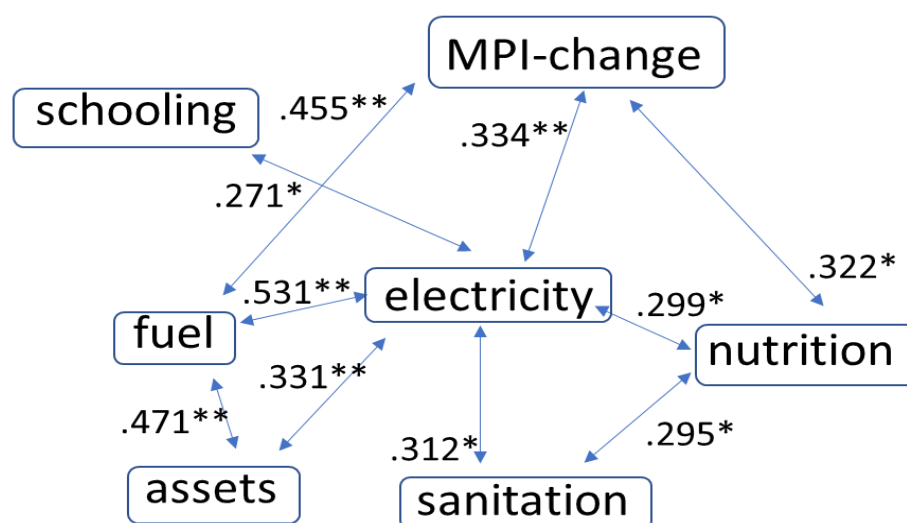
Figure A.1. Scatter plots of public expenditure in education and health and change in MPI



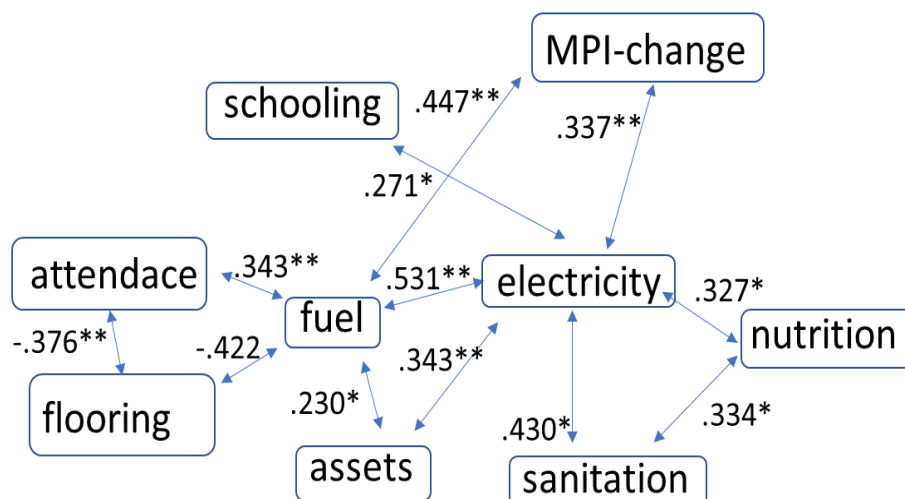
Source: Authors' elaboration.

Figure A.2. Sensitivity analysis for correlations between MPI components

Panel A. “Total sample” with imputed values for the missing values:
N=60

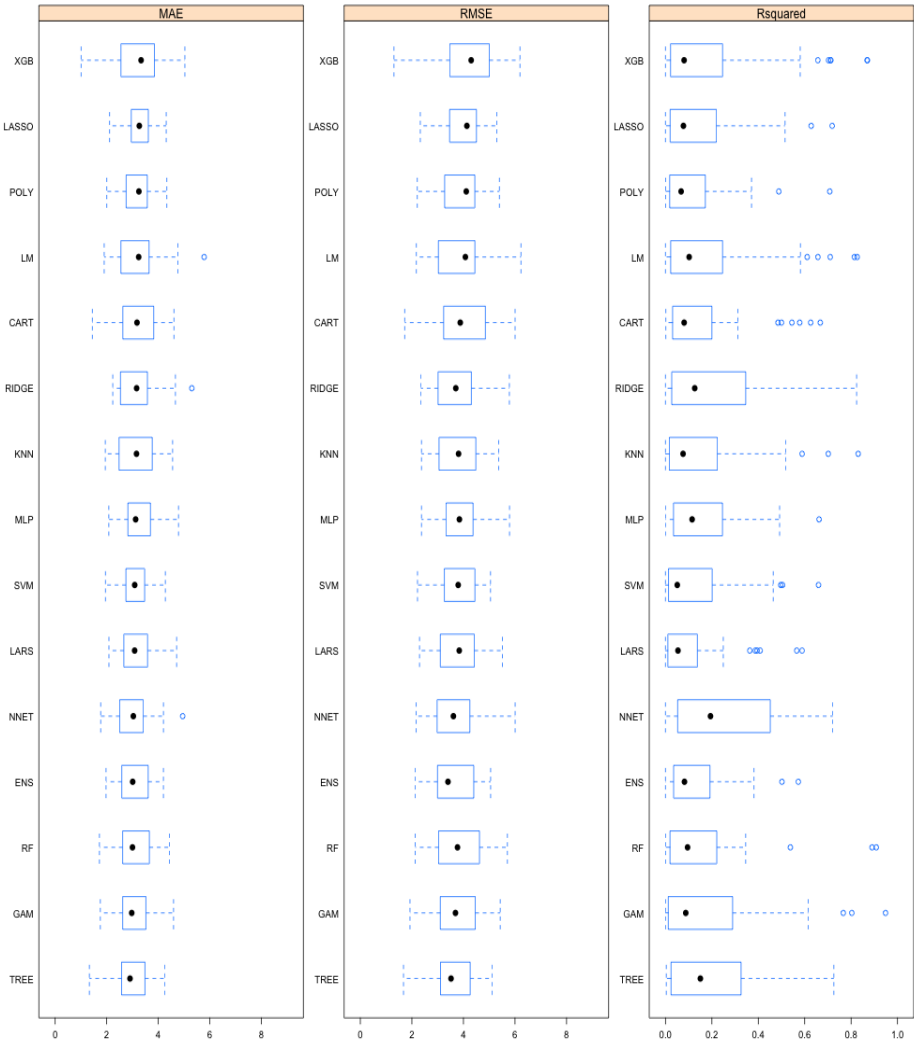


Panel B. Restricted sample: when there were no missing values: N=42



Source: Authors' elaboration.

Figure A.3. Parameters after 100 iterations of Monte Carlo cross validation obtaining a median R² always below 0.25.



Note: The cross-validation was implemented with the caret package using train() with the train control train Control(method="LGOCV", number=100, p=0.8).
Source: Authors' elaboration.

Table A.1. Country classifications under each clusters steps.

Country	ODA	MPI	ALL
Armenia 2005 - 2011	1	1	1
Bangladesh 2004 - 2008	2	2	2
Bangladesh 2007 - 2012	2	2	2
Benin 2001 - 2007	1	3	1
Bolivia 2003 - 2009	3	3	1
Burkina Faso 2003 - 2011	3	3	1
Burundi 2005 - 2011	1	3	1
Cambodia 2005 - 2011	1	3	1
Cameroon 2004 - 2012	1	1	1
Central African Republic 2000 - 2011	1	3	1
Colombia 2005 - 2011	1	1	1
Comoros 2000 - 2013	1	3	1
Congo, Democratic Republic of the 2007 - 2013/15	2	3	2
Cote d'Ivoire 2005 - 2011/13	1	1	1
Dominican Republic 2002 - 2008	1	1	1
Egypt 2005 - 2009	3	1	3
Ethiopia 2000 - 2006	1	3	3
Ethiopia 2005 - 2012	2	3	2
Gabon 2000 - 2013	1	1	1
Gambia 2006 - 2014	1	3	1

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Country	ODA	MPI	ALL
Ghana 2003 - 2009	3	3	1
Guinea 2005 - 2013	1	3	1
Guyana 2005 - 2010	1	1	1
Haiti 2005/6 - 2013	1	3	1
India 1998/9 - 2005/7	3	1	3
Indonesia 2007 - 2013	2	1	2
Jordan 2007 - 2010	3	1	1
Kenya 2003 - 2008/10	3	1	3
Lesotho 2004 - 2010	1	1	1
Liberia 2007 - 2014	1	3	1
Madagascar 2004 - 2008/10	1	1	1
Malawi 2004 - 2011	1	3	1
Mali 2006 - 2012/14	3	3	1
Mauritania 2007 - 2012	1	3	1
Mozambique 2003 - 2012	3	3	3
Namibia 2000 - 2008	1	1	1
Nepal 2006 - 2012	1	2	1
Niger 2006 - 2013	1	3	1
Nigeria 2003 - 2008	1	1	3
Nigeria 2003 - 2013	2	1	3
Nigeria 2008 - 2014	2	1	2

Country	ODA	MPI	ALL
Pakistan 2006/7 - 2012/14	2	1	2
Peru 2005 - 2009	1	1	1
Peru 2008 - 2013	3	1	3
Rwanda 2005 - 2011	1	2	3
Sao Tome and Principe 2000 - 2008/10	1	1	1
Senegal 2005 - 2010/12	3	1	3
Senegal 2005 - 2012/14	3	1	3
Senegal 2010/11 - 2012/14	3	2	2
Sierra Leone 2008 - 2014	1	3	1
South Africa 2008 - 2013	1	3	1
Tanzania 2008 - 2011	2	3	2
The Republic of the Congo 2005 - 2010	1	1	3
The Republic of the Congo 2005 - 2011/13	3	1	3
The Republic of the Congo 2009 - 2011/13	2	3	2
Togo 2010 - 2013/15	1	1	1
Uganda 2006 - 2012	3	1	3
Zambia 2001/2 - 2008	1	3	1
Zimbabwe 2006 - 2010/12	1	1	1
Zimbabwe 2010/11 - 2015	1	1	1

Source: Authors' elaboration.

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Table A.2. Sequencing the clusters.

1-1-1	2-1-2	3-1-1
Armenia 2005 - 2011	Indonesia 2007 - 2013	Jordan 2007 - 2010
Cameroon 2004 - 2012	Nigeria 2008 - 2014	
Colombia 2005 - 2011	Pakistan 2006/7 - 2012/14	3-1-3
Cote d'Ivoire 2005 - 2011/13		Egypt 2005 - 2009
Dominican Republic 2002 - 2008	2-1-3	India 1998/9 - 2005/7
Gabon 2000 - 2013	Nigeria 2003 - 2013	Kenya 2003 - 2008/10
Guyana 2005 - 2010		Peru 2008 - 2013
Lesotho 2004 - 2010	2-2-2	Senegal 2005 - 2010/12
Madagascar 2004 - 2008/10	Bangladesh 2004 - 2008	Senegal 2005 - 2012/14
Namibia 2000 - 2008	Bangladesh 2007 - 2012	The Republic of the Congo 2005 - 2011/13
Peru 2005 - 2009		Uganda 2006 - 2012
Sao Tome and Principe 2000 - 2008/10	2-3-2	
Togo 2010 - 2013/15	Congo, Democratic Republic of the 2007 - 2013/15	3-2-2
Zimbabwe 2006 - 2010/12	Ethiopia 2005 - 2012	Senegal 2010/11 - 2012/14
Zimbabwe 2010/11 - 2015	Tanzania 2008 - 2011	
	The Republic of the Congo 2009 - 2011/13	3-3-1
1-1-3		Bolivia 2003 - 2009
Nigeria 2003 - 2008		Burkina Faso 2003 - 2011
The Republic of the Congo 2005 - 2010		Ghana 2003 - 2009
		Mali 2006 - 2012/14
1-2-1		
Nepal 2006 - 2012		3-3-3
		Mozambique 2003 - 2012
1-2-3		
Rwanda 2005 - 2011		
1-3-1		
Benin 2001 - 2007		
Burundi 2005 - 2011		
Cambodia 2005 - 2011		
Central African Republic 2000 - 2011		
Comoros 2000 - 2013		
Gambia 2006 - 2014		
Guinea 2005 - 2013		
Haiti 2005/6 - 2013		
Liberia 2007 - 2014		
Malawi 2004 - 2011		
Mauritania 2007 - 2012		
Niger 2006 - 2013		
Sierra Leone 2008 - 2014		
South Africa 2008 - 2013		
Zambia 2001/2 - 2008		
1-3-3		
Ethiopia 2000 - 2006		

Note: the first number of the sequence means the ODA clusters; the second the MPIs indicators and the third when education and health expenditures are added.

Source: Authors' elaboration.

Determining the Key Factors of Corporate Leverage in Malaysian Service Sector Firms using Dynamic Modeling

Sitara Karim¹, Mustafa Raza Rabbani² and Mohammad Ahmar Khan³

ABSTRACT

The prime objective of this paper is to investigate the relationship between company-specific factors and firm's leverage of 231 service sector companies of Bursa Malaysia for the period 2008-2018. This study employed dynamic panel regression by employing System Generalized Method of Moments (S-GMM) developed by Blundell and Bond (1998) as the results indicated that the model is genuinely dynamic. Findings reveal that firm size, profitability, liquidity, and growth opportunities are the determinants of corporate leverage in Malaysia service sector firms. Practically, the findings of the study embrace significant insights for corporate tycoons, regulatory bodies and practitioners. Meanwhile, theoretically, the study is important for embracing the predictions of pecking order theory and trade-off theory in terms of explaining the determinants of corporate leverage in Malaysian service firms.

ملخص

يتمثل الهدف الرئيسي من هذه الورقة البحثية في دراسة العلاقة بين العوامل الخاصة بالشركات ورافعتها المالية بحجم 231 شركة تعمل في قطاع الخدمات في بورصة ماليزيا لفترة 2008-2018. ووظفت هذه الدراسة انحدار بيانات اللوحة الديناميكي من خلال استخدام نظام أسلوب اللحظات المعمم (S-GMM) الذي طوره بلونديل وبوند (1998) بحيث أشارت النتائج إلى أن النموذج ديناميكي حقا. وتكشف النتائج أن حجم الشركات، والربحية، والسيولة، وفرص النمو تعتبر العوامل المحددة للرافعة المالية للشركات الماليزية العاملة

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214 Determining the Key Factors of Corporate Leverage in Malaysian Service Sector Firms using Dynamic Modeling

في قطاع الخدمات. ومن الناحية العملية، تتضمن نتائج الدراسة صورة عامة هامة بشأن الشركات، والهيئات التنظيمية، والجهات الممارسة. وفي الوقت ذاته، ومن الناحية النظرية، فإن الدراسة تتسم بالأهمية لاعتماد التنبؤات المتعلقة بنظرية النظام الضريبي ونظرية المقايضة من حيث شرح محددات الرافعة المالية للشركات المالية العاملة في شركات الخدمات.

ABSTRAITE

Le principal objectif de cet article est d'étudier la relation entre les facteurs spécifiques à l'entreprise et l'effet de levier de 231 entreprises du secteur des services de Bursa Malaysia pour la période 2008-2018. Cette étude utilise la régression dynamique de panel en employant la méthode généralisée des moments du système (S-GMM) développée par Blundell et Bond (1998) car les résultats indiquent que le modèle est réellement dynamique. Les résultats révèlent que la taille de l'entreprise, la rentabilité, la liquidité et les opportunités de croissance sont les déterminants de l'effet de levier des entreprises du secteur des services en Malaisie. En pratique, les résultats de l'étude offrent des perspectives importantes pour les magnats de l'entreprise, les organismes de réglementation et les praticiens. Sur le plan théorique, l'étude est importante car elle tient compte des prédictions de la théorie de l'ordre hiérarchique et de la théorie des compromis pour expliquer les déterminants de l'effet de levier des entreprises du secteur des services en Malaisie.

Keywords: Bursa Malaysia, Emerging Market, Leverage, Service sector firms, System GMM

JEL Classification: C22, G32, G34, L22, L24

1. Introduction

The basic idea for a company to use financing sources is due to its ability to cover short-term and long-term fund and at the same time finance the growth of the company's business. Debt policy is one of the important factors of the company in the determination of its survival throughout economic and financial crisis and has a balance between leverage and return on equity due to the factor of risk exerted on the shareholders and company itself. Moreover, it is very important for companies to specify their best plans and strategies in managing their debt obligation and operation during the adverse economic condition because it will determine the future of the company's growth. In other words, leverage is one of the best finance sources because it allows the company to borrow a substantial amount of money and invest it to expand the firm's

operation, asset base and also generate returns on risk capital (Ni'mah *et al.*, 2020).

However, the uses of leverage would lead the company to have an excess amount of cash and this could trigger the misuse of excess free cash flow as it may cause conflicts of interest between shareholders and management (Karim *et al.*, 2019). Furthermore, in the context of Malaysia with a Gross Domestic Product (GDP) of RM 1,446.9 billion in 2018, Malaysia is classified as an emerging country and according to Bank Negara Malaysia's (BNM) (2018) report, the non-financial corporate (NFC) debt grew about 6.5 percent to 103.7 percent of GDP during the year of 2018 compare to the previous year and the business was primarily supported by domestic financing about 74 percent of total NFC debt. Even though the growth of debt generally would reflect a negative perception by the stakeholders, the overall business reported by BNM has maintained comfortable liquidity and debt servicing position during the year (Kazekami, 2017). The healthy financial gearing has supported debt servicing capacity thus resulted in increases of Malaysia's GDP (Indrawan and Rahman, 2020). According to Plecher (2020), the share of economic sectors in Malaysia's GDP was mostly contributed by service sectors about 52.96 percent followed by industrial sector around 38.3 percent and last but not the least agriculture around 7.54 percent.

Moreover, the study emphasized on the service sector companies in Malaysia due to the sector's performance in Second Industrial Master Plan (IMP2) which states that service sector in Malaysia has become popular thus contributes to the development of Malaysian economy. In addition, the Third Industrial Master Plan (IMP3) for year 2006 to 2020 has been laid out by the policymakers in an effort to improve and build a dynamic service sector to acknowledge this sector as the next Malaysia's economy prime driver (Ministry of International Trade and Industry [MITI], 2010). Furthermore, service sector of Malaysia has recorded the highest percentage share in GDP during 2018 and according to World Bank Data (2019), from 2008 to 2018, domestic credit by banks to private sector in Malaysia (% of GDP) has surge from 96.61% in year 2008 to 120.35% in 2018.

A number of researches have been conducted on leverage but most of them focused more on developed countries rather than developing countries (Kayo & Kimura, 2011; Roslee, 2017; Silva, 2020). Moreover, studies analyzing the choice of capital structure and determinant of

leverage in developing countries is limited even though many researchers have examined it using various kind of variables such as profitability, size, growth prospect and asset tangibility to name a few (Faris, 2011). The statement also supported by Vo (2016), where the author states that there is no single theory specifically defining on the choice of capital structure. Additionally, Mramor and Črnigoj (2009) also mentioned that capital structure in emerging markets or in developing country are still in an open investigation. Moreover, the interest of this research paper to focus on Malaysia is also because of the structure of companies in Malaysian market is distinct from most of developed countries due to the dependency and close relationships with banking sector (Alam *et al.*, 2021; Suto, 2003), heavy and strong political support (Johnson & Mitton, 2003) and significant family controls factors (Wiwattanakantang, 1999). Meanwhile, most of prior studies focused on the static rather than dynamic nature of capital structure of a company and majority of the research papers have not been done in emerging market (Nejad & Wasiuzzaman, 2015). Moreover, the determinant of leverage or capital structure of a company may differ not only from developed to developing country or one country to another country but also from sector to another sector within the country itself (Rabbani *et al.*, 2021a,b; Sabir & Malik, 2012). The selection of service sector in this research is not only due to the highest percentage share in GDP during 2018 (World Bank Data, 2019) but also due to the confrontation in difficulty of securing funds especially when the companies' nature of business is based on their intangible assets (Ahmad & Aris, 2015).

Briefly, findings indicate that firm size, profitability, liquidity, and growth opportunities determine corporate leverage of Malaysian service firms. However, sustainability (company age), net profit margin and liquidity are not related to company's leverage in Malaysia. Empirically, results embrace the predictions of pecking order theory and trade-off theory in terms of explaining the determinants of corporate leverage in Malaysian service firms. For practitioners, the study is important for Malaysian service firms to maintain their optimal financial stability, capital structure and company-specific factors. In the same vein, findings of the study are significant for corporate tycoons, regulatory bodies and practitioners.

The remaining paper is assorted in the following manner: Section 2 reviews the earlier empirical studies along with hypothesis development; Section 3 states the methodology of the study. Section 4 provides empirical results and analysis whereas Section 5 gives the discussion on

empirical results. In the end, research paper concludes with brief summary and theoretical and practical implications.

2. Literature Review

2.1 Empirical Evidence on Determinants of Corporate Leverage

Owners of the company face a high degree of risk when they decide to use financial leverage due to the increased level of inability and burden to the company to service the debt (Roslee, 2017). This would make the optimal structure between equity and debt become harmonized thus leads to reduce the cost of fund in a company (Barakat, 2014). Various kinds of sensible definitions and descriptions have been used in an effort to monitor the factors which are correlated with leverage. Among the factors that have been discussed by previous researchers, the first things that becomes the main concern is regarding on the measurement of leverage whether to use book leverage (total debt to total asset) or market leverage (total debt to sum of book debt plus market value of equity). According to George *et al.*, (2020), market leverage is better measurement since it is incorporated with the updated market view on companies' growth opportunities and its value. The literature was based on Borio (1990), where he states that economic analysts usually employ market leverage as proxy due to its behavior as forward-looking while book leverage been seen as backward looking which do not entirely reflect on company's debt capacity and financial health with respect to the current market economic condition. The suggestion by Borio (1990) also became the base argument in selecting the market leverage instead of book leverage as dependent variable by Harford *et al.*, (2009). Moreover, the selection of market leverage rather than book leverage was because of book value of company can be negative which may lead to problems in the measurement of leverage (Welch, 2004).

In contrast to the arguments mentioned above, there are several studies suggesting that book leverage is better than market leverage as stated by Myers (1984), which focuses and prefers to use book leverage because debt is more suitable to be retained by asset already in place. Author also states that significant part of most firms' market value is valued for by assets which are not yet in place for example present value of future growth opportunities (Atif *et al.*, 2021; Yahaya *et al.*, 2020). Moreover, the definition of leverage as debt ratio also been claimed to be more appropriate as it is viewed of what is left for shareholders in the event of

liquidation of a company (Rajan and Zingales, 1995). Furthermore, in term of short-term debt especially in case of developing countries, the short-term debt represents a significant portion of a company's total debts (Sheikh and Wang, 2011). The short-term debt includes bank overdraft which at the time could be converted into source of long-term financing, even though it is said to have more risk in the company perspective due to the repayable factor in demand (Omran and Pointon, 2009). Besides, book leverage is more suitable to be used in this research paper as this research used secondary data from DataStream and financial statement of a company which are more relevant to the historical data provided with the characteristic of book leverage (backward looking). Thus, this study employs book value leverage (total debt to total asset) as a dependent proxy to represent leverage of a company.

2.2 Hypotheses Development

This study determines the causality between firm's leverage and associated variables (sustainability, profitability – net profit margin and return on equity, firm size, liquidity – cash ratio and quick ratio, and growth opportunities), that are hypothesized below:

2.3.1 Sustainability

In this study, the proxy used to represent sustainability is company's age. Previous studies explained firm age as the total number of years the firm is established or came into existence and found some positive significant effects (Archer and Faeber, 1966) while there are also studies that have negative and significant effect on age when it is defined as number of years since incorporation. Pecking order theory asserts that an older company has better and greater capacity to accumulate and retain their earnings over time. Moreover, the older the company is, the larger is its information being recorded from time to time. Trade-off theory assumes a positive relation between age and debt ratio (leverage) of a company in the fact that mature firms have bigger experience and better reputation that can reduce agency costs via positive signal from the quality of potential investment (Adair *et al.*, 2015). An analysis and investigation on the relationship between company leverage and its age is very crucial for the use of management to monitor their company historical for future growth and sustainable factors in the market. Meanwhile, it is asserted that as the company grow older, the performance of the company would

also decline thus eventually causing most of the companies to be taken over. The statement was supported by Kwarbai *et al.* (2016), which state that as a company gets older, the company becomes more focused with their core competencies which then eventually limits their activities thus lower the growth rate of the company. However, the theoretical relationship between age and company capital structure is still in an ambiguity.

A study by Ahmad and Aris (2015) found that age has a negative relationship to debt ratio and able to aid in firm's decision to seek debt financing. The result is also similar with Viviani (2008), and Caneghem and Campenhout (2012), where they also found a negative relationship between age and debt ratio. Moreover, a study by Uyar and Guzelyurt (2015), also found the same result which is negative and significant when they investigated on the influence of firm characteristic to the capital structure in Turkey and it was also supported by Ogbulu and Emeni (2012). Furthermore, Kumar and Rao (2016) found that a negative relationship between firm age and leverage of the companies. All these research papers were in line with Pfeffermayr, Stockl, and Winner (2008), where they states that a company that sustains in the market for a long period of time might have build a strong foundation and reasonable amount of retained earnings and reserves which could serve as a better alternatives to debts. Contrarily, Bajagai *et al.*, (2019) examined the effect of ownership structure and corporate governance to the capital structure in Nepalese listed companies showed that the relationship for the age of the company is positive and significant with leverage as the older the company, the higher the leverage incurred. Furthermore, in the study of capital structure determinants in India by Chadha and Sharma (2016) with sample of 422 manufacturing companies between year 2003-2013 showed that firm age have positively significant relationship with the company's leverage and this study was also supported by Zare, Farzanfar and Boroumand (2013) and Sanusi (2014).

As routed from previous studies, it is hypothesized that;

H1: *There exists a significant nexus between the sustainability and company's leverage.*

2.3.2 Size of the Companies

The investigation of relationship between size and company's leverage has also been widely discussed in previous researchers as size is commonly related with the risk of the company when considering leverage. However, there is an inconsistency in findings about the relationship, for instance, Ahmad and Aris (2015) and Bajagai *et al.* (2019) found a significant positive relationship between size and leverage, while Masor (2017) and Rouf (2018) found a significant negative relationship with leverage. The negative relationship is also similar with Dinlersoz *et al.* (2018), where they argue that firm size and leverage are inversely related as public firms are usually independent of their size. Due to these various results, its hypothesized that;

H2: *There exists a significant nexus between the size and company's leverage.*

2.3.3 Profitability

The investigation between profitability and companies' leverage also had been given a big attention throughout the globe as the profitability is very much related with the performance of the companies and it is also believed to be one of the features that could affect the company's capital structure (Masor, 2017; Hassan *et al.*, 2020). Similar to previous relationship results, profitability also had both positive and negative relationship with leverage. The significant positive relationship showed in Kumar and Rao (2016), and Gweyi and Karanja (2014). On the other hand, a negative relationship showed in Ting (2016), Balios *et al.* (2016), Masor (2017), and Nisha and Ghosh(2018). Therefore, it is hypothesized that;

H3a: *There exists a significant nexus between the profitability (ROE_{it}) and company's leverage.*

H3b: *There exists a significant nexus between the profitability (NPM_{it}) and company's leverage.*

2.3.4 Liquidity

The liquidity of the company is believed to play an important role for the businesses to being able in settling its shot-term obligation. A pros and cons have been shown in previous literature regarding the importance of liquidity in the determining the leverage. Thus, different results by

Alkhatib (2012) have shown a significant positive relationship with companies' leverage, while Dakua (2018) showed an insignificant positive relationship while using current ratio as a proxy of liquidity. The other majority researchers with current ratio as proxy, agreed with the significant negative relationship between liquidity and leverage such as in Ahmad et al., (2012), Ahmad and Aris (2015), Vo (2016), and Khemiri and Noubbigh (2018). Moreover, Roslee (2007) using both quick and cash ratio, and Kila et al., (2008) using quick ratio, also agreed with the significant negative relationship with leverage. Thus, it is hypothesized that;

H4a: *There exists a significant nexus between the liquidity (CR_{it}) and company's leverage.*

H4b: *There exists a significant nexus between the liquidity (QR_{it}) and company's leverage.*

2.3.5 Growth Opportunities

The literature on growth opportunities and leverage revealed both positive and negative effect on companies' leverage. Most of the literature agreed with the insignificant relationship between growth opportunities and companies' leverage whereas negative relationships are reported in Pouraghajan *et al.* (2012), and Nisha and Ghosh (2018), and positive relationships are reported in Vo (2016), and Matias and Serrasqueiro (2017). However, there is only one study of Nejad and Wasiuzzaman (2015) which found the significant negative relationship between growth opportunities and leverage. Therefore, it is hypothesized that;

H5: *There exists a significant nexus between the growth opportunities and company's leverage.*

3. Methodology

3.1 Data and Variables

The empirical test in this research paper is based on the sampling frame service sector companies listed on Bursa Malaysia. The service sector companies were chosen because this sector was the highest percentage share in GDP during 2018 (52.96%) and it is an important sector that the government would like to focus on for economic growth in the future ahead. This research paper covers 11 years (2008-2018) of observation period on panel data. All of the samples data were constructed according

to the sample selection criteria: Only service sector companies listed on Bursa Malaysia were selected rather than industrial and agriculture sector. The first stage in data screening is done by meeting the requirements of companies' age of establishment (must establish before year 2008) to avoid inadequate in data screening. The third data screening is by excluding the companies with a lot of data errors to avoid any imbalance data between companies and all the active and non-active companies were included in the sample data to avoid survivorship bias. Based on the screening process, this study manages to collect 231 out of 314 companies that met all of the requirements needed. This final collection samples represent panel data set of 2,541 firm-year observation for eleven years (2008-2018).

Table 1 indicates the operationalization of the key variables used in the study.

Table 1 Operationalization of the Key Variables

Dependent Variable	Unit	Proxied By	Definition
Leverage	(%)	LEV_{it}	Total Debt /Total Asset
Independent Variables			
Sustainability (AGE)	(Year)	$SUSAge_{it}$	Company age of business
Profitability (NPM)	(%)	NPM_{it}	Net Profit /Revenue
Profitability (ROE)	(%)	ROE_{it}	Earnings before interest, tax, and depreciation/ Total Equity
Size (Total Asset)	(USD'000)	$SIZETA_{it}$	Natural Logarithm Of Total Assets
Liquidity (Quick Ratio)	(Quick Times)	$LIQ(QR)_{it}$	(Current Asset-Inventories) /Current Liabilities
Liquidity (Cash Ratio)	(Times)	$LIQ(CR)_{it}$	All Cash /Current liabilities
Growth Opportunities	(%)	$GROP_{it}$	Market value of firm/ Total Asset

For estimations purpose, the following regression is used for the analysis.

$$\begin{aligned}
 LEV_{i,t} = & \alpha_0 + \alpha_1 SUSAge_{i,t} + \alpha_4 NPM_{i,t} + \alpha_5 ROE_{i,t} \\
 & + \alpha_3 SIZETA_{i,t} + \alpha_6 QR_{i,t} + \alpha_7 CR_{i,t} + \alpha_8 GROP_{i,t} \\
 & + \alpha_9 LEV_{i,t-1} + e_{i,t} \dots \dots \dots (1)
 \end{aligned}$$

3.2 Descriptive Statistics of Variables and Correlation Matrix

Table 2 indicates the overall mean values of the variables used in the study over the period of 2008 to 2018. The result represents both active and inactive companies with the total of 231 which are categorized under non-financial service sector. The mean value of leverage indicates that Malaysian service firms owe 0.62 cents against worth to total assets counted as single Malaysian Ringgit. Moreover, sustainability indicates the mean value of 16.48 years; net profit margin yields average value of 0.0298 percent whereas return on equity reveals average value of 3.8445. The average size of service sector firms in Malaysia is 12.78. Meanwhile, the liquidity ratios indicate average values of 2.08 and 1.14 times for quick ratio and cash ratio respectively. Finally, growth opportunities show the mean value of 1.0668 percent for service sector firms of Malaysia over the period 2008-2018.

Table 2		Descriptive Statistics			
Variable	Obs.	Mean	Std. Dev.	Minimum	Maximum
LEV_{it}	2541	0.6279	0.5632	0.1201	0.7462
$SUSAge_{it}$	2541	16.48	9.137	0.0185	22.387
NPM_{it}	2541	0.0298	18.2130	-27.287	27.098
ROE_{it}	2541	3.8445	21.379	-10.489	11.269
$SIZETA_{it}$	2541	12.7843	2.2890	0.1369	18.379
QR_{it}	2541	2.0816	2.7444	0.0321	17.893
CR_{it}	2541	1.1408	2.0613	0.0032	18.166
$GROP_{it}$	2541	1.0668	7.3387	0.0687	34.218

In addition, Table 3 gives the correlation of variables used in the study and values of each correlated variables indicate no serious problem of multicollinearity.

Table 3 Correlation of Variables

Variables	LEV_{it}	$SUSAg_{it}$	NPM_{it}	ROE_{it}	$SIZETA_{it}$	QR_{it}	CR_{it}	$GROP_{it}$
LEV_{it}	1							
$SUSAg_{it}$	0.12** *	1						
NPM_{it}	0.15** *	0.24***	1					
ROE_{it}	-0.14	0.15***	0.22*	1				
$SIZETA_{it}$	-0.13	0.16***	0.13*	0.15** *	1			
QR_{it}	-0.12	0.15***	0.23*	0.17** *	0.12***	1		
CR_{it}	0.19** *	0.16***	0.11** *	0.14** *	0.23***	0.21** *	1	
$GROP_{it}$	-0.24** *	-0.18***	0.13	-0.12*	-0.11*	-0.19*	-0.12	1

Significant at: *10, **5, and ***1 percent levels.

4. Data Analysis, Empirical Results and Discussion

4.1 Diagnostic Tests

It is crucial to run a diagnostic test before presenting the results estimation on the determinant factors of firm leverage in Malaysian service sector listed companies. A standard diagnostic test is required for all variables to ensure the consistency, reliability and effectiveness of the GMM estimation which also depends on the instruments' validity and the non-existence of serial correlation of the residual. Table 4 shows the result obtained from the diagnostic test. First and foremost, test of misspecification by Sargan's (1964) is being used to ensure the validity of the instrument. Moreover, to assure the instruments in the particular model are not redundant and validity of over-identifying restrictions, the null hypothesis for Sargan test is needed. Therefore, by accepting the null hypothesis which has been created, it shows that the group of instruments is valid and the model specification is appropriate.

The final result shows in the Table 4 are in line with the findings by Arellano and Bond (1991), where the two-step S-GMM has been applied. Since, one-step S-GMM Sargan test is sensitive to heteroskedasticity (p-

value < 0.05), which then lead to the instruments' validity being rejected. The presence of heteroskedasticity of unknown form has made the Sargan diagnostic test to be repeated for the two-step S-GMM and it shows that the Sargan diagnostic test for the model does not reject all of the set over-identifying restriction (p-value > 0.05) which means that the over-identifying restrictions are valid. The high p-value of the Sargan diagnostic test which is more than 0.05 indicates that the instruments used are exogenous and the model is suitable and appropriate. Moreover, the result also shows that the model is well specified because there is no autocorrelation problem and thus the estimator chosen are consistent.

Furthermore, there is another diagnostic test for dynamic panel data estimation which is Arellano-Bond (1991)'s test where it tests for autocorrelation between the residuals (AR). According to Arellano and Bond (1991), the diagnostic test is important to be implemented as to analyze the instruments' validity in the dynamic nature of data. The assumption of the first-order serial correlation (AR(1)) model means that for the current period (period t), all the residuals in the model are associated to their respective residuals of previous period (period $t-1$). Next, the assumption of second-order serial correlation (AR(2)) shows that the residuals in period t relies on the residual of period $t-1$ and $t-2$. According to the theory, if the normal distribution is approached by the Arellano-Bond test, the zero autocorrelation's test in first difference residual must (must not) reject the null in the no first-order (second-order) serial correlation (Wooldridge, 2002). Apparently, the AR(2)'s test of residuals in first-difference equation is better than AR(1)'s test of residuals (Karim *et al.*, 2020a,b,c; Karim, 2021a,b). The reason behind this result is due to the test for AR(2) is to detect the existence of the first different residuals in period $t-1$ and $t-2$ (Roodman, 2009). Overall, the results of the diagnostic test for both AR(1) and AR(2) are reported in the Table 4 and the test for AR(2) meets the requirement to accept the no second order serial correlation of the first-difference residuals (p-values > 0.05). Since, two-step S-GMM gave appropriate measurements for model specifications and autocorrelation, thus, the final estimator chosen for this study is two-step S-GMM where further analysis is carried out to investigate the determinants of corporate leverage in Malaysian service sector firms.

Table 4: Diagnostic Tests based on Two-Step S-GMM

$$\text{Model 1: } LEV_{i,t} = \alpha_0 + \alpha_1 SUSAge_{i,t} + \alpha_4 NPM_{i,t} + \alpha_5 ROE_{i,t} + \alpha_3 SIZE_{i,t} + \alpha_6 QR_{i,t} + \alpha_7 CR_{i,t} + \alpha_8 GROP_{i,t} + \alpha_9 LEV_{i,t-1} + e_{i,t}$$

Sargan test of over-identifying restrictions (p-value)	42.64 (0.529)
1 st order autocorrelation Test (p-value)	-6.47 (0.0000)
2 nd order autocorrelation Test (p-value)	-0.22 (0.826)
Sargan test for over-identifying restriction (p-value)	Pass
2 nd order autocorrelation Test (p-value) (>0.05)	Pass
Firm-year observation	2541
T	9
No. of groups	231
No. of instruments	53

4.2 Empirical Results

As shown in the Table 4, the dynamic model of one-step S-GMM, two-step S-GMM and two-step S-GMM with p lags of dependent variable indicates that the dependent variable is affected by most of the independent variables except for $SUSAge_{i,t}$, $NPM_{i,t}$, and $CR_{i,t}$. As overall, the analysis has been done by using one-step, two-step and two-step with robust standard errors to show the differences between steps estimator. The differences between step-one and step-two S-GMM is due to the presence of heteroskedasticity of unknown form in the step-one estimator. While the results of two-step estimator are more efficient in large sample as it has a consistent estimation of variance-covariance matrix which then relax the presumption of independence and homoskedasticity (Arellano & Bond, 1991). The implementation of two-step S-GMM with robust standard error was to correct the finite-sample bias.

As indicated in Table 5, the differences between both one-step and two-step S-GMM are of the amount of its coefficients and significant confidence level. The important difference is focused on the variables' $NPM_{i,t}$ where in on-step S-GMM, the result shows a significant levels of 10 percent but when the same data was run with two-step S-GMM, the result shows an insignificant level of confidence. The same goes to $CR_{i,t}$ variable where in one-step S-GMM, the result shows a significance level

of 5 percent but in two-step S-GMM, the result becomes completely insignificant. Moreover, in contrast to the results obtained which is significant to insignificant, the results of $GROP_{i,t}$ variable shows an insignificant confidence level in step-one S-GMM but in the two-step S-GMM it became significant to the level of 5%. The two-step S-GMM VCE robust was applied to strengthen the results of two-step S-GMM without VCE robust. The result shows that the $QR_{i,t}$ variable changes from 1 percent to 5 percent significance level and $GROP_{i,t}$ turn from 5 percent to 10 percent significance level. Therefore, this study focused and analyzed on the two-step S-GMM as it depicts a more efficient and robust results.

Table 5: Dynamic Model Regression based on S-GMM

Financial Leverage Indicator	One-Step S-GMM (1)	Two-Step S-GMM (2)	Two-Step S-GMM (Robust) (3)
Constant	-15.073 (-7.04) ***	-11.684 (-4.86) ***	-11.684 (-3.24) ***
$SUSAge_{it}$	-0.043 (-0.71)	-0.059 (-1.09)	-0.058 (-0.89)
NPM_{it}	0.002 (1.79) *	0.002 (1.52)	0.002 (0.75)
ROE_{it}	-0.084 (-6.40) ***	-0.086 (-6.26) ***	-0.086 (-3.77) ***
$SIZETA_{it}$	1.879 (13.82) ***	1.563 (8.16) ***	1.563 (5.38) ***
QR_{it}	-0.099 (-3.97) ***	-0.757 (-3.45) ***	-0.757 (-2.33) ***
CR_{it}	0.631 (18.31) ***	0.653 (17.84) ***	0.653 (10.71) ***
$GROP_{it}$	-0.029 (-0.96)	-0.021 (-2.16) **	-0.021 (-1.94) **
L	0.631 (18.31) ***	0.653 (17.84) ***	0.653 (10.71) ***

Significant at: *10, **5, and ***1 percent levels.

4.3 Discussion on Empirical Results

Focusing the empirical results given in column(s) 2 and 3 of Table 5, sustainability shows a negative coefficient of -0.059 ($z = -1.09$) (column 2) and 0.058 ($z = -0.89$) (column 3) with an insignificant level to the dependent variable of leverage. The results for sustainability support the pecking order theory where it indicates that the older the company, the greater the capacity to accumulate and retain their earnings over time. The relationship is in line with the studies by Viviani (2008), Caneghem and

Campenhout (2012), Ahmad and Aris (2015), Uyar and Guzelyurt (2015), Kumar and Rao (2016), and Masor (2017).

Correspondingly, $NPM_{i,t}$ shows a positive coefficient of 0.002 ($z = 1.52$) (column 2) and 0.002 ($z = 0.75$) (column 3) but it was insignificant. This shows that $NPM_{i,t}$ does not significantly affect the decision in incurring leverage in listed service companies of Malaysia. On the other hand, $ROE_{i,t}$ shows an inverse relationship where a negative coefficient of -0.086 ($z = -6.26$) (column 2) and -0.086 ($z = -3.77$) (column 3) with significant at 99 percent confidence level. The first proxy of profitability ($NPM_{i,t}$) supports the trade-off theory where the positive relationships is due to the assumption of the more profit of the company, the lower the probability of the company to become bankruptcy (Fama & French, 2002) and also supports Frank and Goyal (2009) and La Rocca et al., (2009), a profitable company is more likely to borrow compared to a less profitable company in order to have benefit from the tax shield. But unfortunately, the $NPM_{i,t}$ does not apply in listed service companies of Malaysia because the results shows an insignificant level of confidence which implies that net profit margin is not one of the factors that significantly impact in the decision of incurring companies' leverage. The service companies in Malaysia may not solely depends on the net profit margin factor in obtaining debt financial resources. The positive relationship alone regardless of proxy been used as profitability are in line with the studies by Gweyi and Karanja (2014), and Dakua (2018). Conversely, the second proxy ($ROE_{i,t}$) shows opposite results where it supports the pecking order theory that companies which are more profitable are more likely to exchange debt for internal funds. This indicates that service companies in Malaysia prefer to use internal funds rather than debt finance. This could support the argument by Myers and Majluf (1984), where most of the companies prefer internal sources over external sources of financing because high profitability boost the availability of company's internal funds thus increase the adjustment capital structure speed towards optimal. The significant negative relationship is in line with the studies by Sheikh and Karim, (2016), Ting (2016), Balios *et al.*, (2016), Masor (2017), Roslee (2017) and Nisha and Ghosh (2018).

Notably, size ($SIZETA_{i,t}$) shows a positive coefficient of 1.563 ($z = 8.16$) (column 2) and 1.563 ($z = 5.38$) (column 3) with a significant at the 99 percent confidence level. The significant positive relationship supports the studies by Ahmad and Aris (2015) and Bajagai *et al.* (2019). The positive relationship shows that the public listed service companies in

Malaysia align with trade-off theory where the theory suggested that a big company is more fond to use more debt compare to small companies and this is also in line with Sheikh and Wang, (2011), Sheikh and Karim, (2015), Sheikh and Kareem, (2015), where they believe that bigger companies in term of size may have bigger capabilities and could enjoy economies of scale which in turn would influence the productivity and return of the companies.

Furthermore, out of liquidity ratios, quick ratio ($QR_{i,t}$) shows a negative coefficient of -0.757 ($z = -3.45$) (column 2) and -0.757 ($z = -2.33$) (column 3) with significance at 99 percent confidence level. The first proxy of $QR_{i,t}$ support the pecking order theory where a high level of liquidity may give a favorable choice to the companies in using their own assets as financing sources rather than issuing debt to finance their business operations (Nisha & Ghosh, 2018). The significant negative relationship supports the literature by Kila *et al.*, (2008), which also use the same proxy and indicates that firms with high liquidity could finance their businesses using excess cash inflow due to being able in generate high in cash and this result also is in line with the research by Roslee (2007). The other literature also found a significant negative relationship but with different proxy (current asset) as shown by Ahmad & Aris (2015), and Vo (2016).

On the other hand, $CR_{i,t}$ shows an insignificant positive relationship between the variable and ($LEV_{i,t}$). The positive coefficient shows a 0.381 ($z = -2.16$) (column 2) and 0.0381 ($z = 0.69$) in the Table 4.3.2. The result is in line with trade-off theory where companies with high level of liquidity may have high in debts due to the greater ability of the companies in meeting their short-term debt thus makes it relevant in having a positive relationship between liquidity and debts (Khan, 2012). The insignificant positive relationship is in line with the research by Dakua (2018). The positive relationship alone can be supported by Alkhatib (2012).

Finally, growth opportunities ($GROP_{i,t}$) depict a negative relation coefficient at -0.021 ($z = -2.16$) (column 2) and -0.021 ($z = -1.94$) (column 3) with a significant confidence level at 95%. The negative relationship supports the trade-off theory where growth company could incur higher financial distress costs and also lower in cost of agency of free cash flow. This also supported the statement by Nisha and Ghosh (2018) where they stated that companies with higher growth opportunities are likely to use equity financing instead of debt financing because they

refuse to pass up future positive earning investment opportunities. The negative results alone are in line with the previous studies by Nisha and Ghosh (2018), while the significant negative relationship supports the result by Nejad and Wasiuzzaman (2015).

In sum, it can be concluded that the use of two-step S-GMM varies the results due to endogenous nature of data. S-GMM caters the problems of endogeneity, simultaneity, and reverse causality, thus, gives concrete and reliable results. In this way, this study is unique in providing the evidence on determinants of corporate leverage using the dynamic modelling.

5. Conclusion

This study investigated the determinant factors that affect leverage of service listed companies in Bursa Malaysia. The purpose of the study is to identify whether the selected company-specific factors could impact the decision of company's leverage. The independent variables namely sustainability, size, liquidity, profitability, prior leverage and growth opportunities were retrieved from DataStream during 2008 to 2018. The data comprised of 231 public listed service companies with 2,541 firm-year observations.

In this study, the results show that company's leverage is determined by profitability (ROE), size, liquidity (Quick Ratio), and growth opportunities. This shows that most of the listed service companies in Malaysia used these company-specific factors to determine their future company's leverage. The other company-specific factor such as sustainability (age), profitability (NPM) and liquidity (Cash ratio) was found as an insignificant influence to the listed service companies of Malaysia probably due to the public listed companies in Malaysia using leverage regardless of these factors because the age of the company is not a big concerning matters to the financial institution as long as the company provide a good proposal and a clean history of loan, while the net profit margin was not a big deal when the companies have a promising total assets as a collateral and a good return on equity.

On grounds of methodological novelty of the study, this study provided unique contribution by using the S-GMM estimator to investigate and analyze the dynamic relationship between leverage and its company-specific factors within the context of Malaysian listed service companies. There are many researchers who used different regression method such as multiple regression (Kwarbai *et al.*, 2016; Nisha & Ghosh, 2018; Dakua,

2018; Bajagai *et al.*, 2019), Pooled OLS regression (Nejad & Wasiuzzaman, 2015; Ting, Azizan & Kweh, 2015; Balios *et al.*, 2016) and threshold regression (Ibhagui & Olokoyo, 2018) but this study used S-GMM estimator which could strengthen the results in increasing of reliability and validity of the findings. The dynamic panel regression (multiple-period approach) is preferred to evaluate accounting-based and risk-return relationship which suggests that each association was not immediate but realized over the historical data. Due to this reason, managers and corporations can rely on this method since the accounting-based variables and accounting measurement could be controlled directly to make decision at the firm-level. Furthermore, the relationship of company-specific factors with company's leverage is also applicable to the used of various stakeholders such as investors in the level of capital market.

On the other hand, the results also could be used as a reference for service companies in Malaysia to maintain their optimal financial stability, capital structure and company-specific factors. The reason is because most of the variables tested such as size, profitability (ROE), liquidity (Quick ratio), and growth opportunities have great influence on the decision of company's leverage. Meanwhile, for the investors (retailers, financial institution, corporate investment and international investors), they could use these findings as a guideline or precautionary measures to select the best valuable companies as to maximize their stakeholder wealth maximization. In the end, for the academicians, these results could be used as a reference for developing new ideas to improve future investigation in determining the factors of firm leverage by employing the dynamic panel model.

References

- Abdeljawad, I., Mat-Nor, F., Ibrahim, I., & Rahim, R. (2013). "Dynamic Capital Structure Trade-off Theory: Evidence from Tehran." *International Review of Business Research Papers*, 9(6), 102 – 110.
- Adair, Adaskou, & McMillan, D. (2015). "Trade-off theory vs. pecking order theory and the determinants of corporate leverage: Evidence from a panel data analysis upon French SMEs (2002–2010)". *Cogent Economics & Finance*, 3(1), 1006477.
- Ahmad, N., Salman, A., & Shamsi, A. (2015). "Impact of Financial Leverage on Firms' Profitability: An Investigation from Cement Sector of Pakistan." *Research Journal of Finance and Accounting*, 6(7), 75-80.
- Ahmad, N., & Aris, Y. B. (2015). "Does Age of the Firm Determine Capital Structure Decision? Evidence from Malaysian Trading and Service Sector." *International Business Management*, 9(3), 200-207.
- Alam, M., Rabbani, M. R., Tausif, M. R., & Abey, J. (2021). "Banks' Performance and Economic Growth in India: A Panel Cointegration Analysis." *Economies*, 9(1), 1-13.
- Alkhatib, K. (2012). "The Determinants of Leverage of Listed Companies." *International Journal of Business and Social Science*, 3(24), 78-83.
- Archer, S., & Faeber, R. (1966). "Firm size and the cost of externally secured equity capital." *Journal of Finance*, 21(1), 69-83.
- Arellano, M., & Bond, S. (1991). "Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations." *The Review of Economic Studies*, 58(2), 277-289.
- Atif, M., Rabbani, M. R., Bawazir, H., Hawaldar, T. H., Chebab, D., & Karim, S. (2021). "Oil price changes and stock returns: fresh evidence from oil exporting and oil importing countries." *Cogent Economics & Finance*, In press.
- Balios, D., Daskalakis, N., Eriotis, N., & Vasiliou, D. (2016). "SMEs capital structure determinants during severe economic crisis: The case of Greece." *Cogent Economics & Finance*, 4(1), 1145535.
- Bajagai, R., Keshari, R., Bhetwal, P., Sah, R., & Ntha Jha, R. (2019). "Impact of Ownership Structure and Corporate Governance on Capital

Structure of Nepalese Listed Companies.” *Business Governance and Society*, Chap 22.

Barakat, A. (2014). “The Impact of Financial Structure, Financial Leverage and Profitability on Industrial Companies Shares Value (Applied Study on a Sample of Saudi Industrial Companies).” *Research Journal of Finance and Accounting*, 5(1), 2222-2847.

Blundell, R., & Bond, S. (1998). “Initial conditions and moment restrictions in dynamic panel data models.” *Journal of Econometrics*, 87(1), 115-143.

Borio, C. (1990). “Leverage and financing of non-financial companies: an international perspective.” BIS Economic Papers, Bank for International Settlements, Basle.

Bradley, M., Kim, E., & Jarrell, G. (1984). “On the existence of an optimal capital structure: Theory and Evidence.” *The Journal of Finance*, 39(3), 857-878.

Caneghem, T., & Campenhout, G. (2012). “Quantity and quality of information and SME financial structure.” *Small Business Economics*, 39(1), 341-358.

Chadha, S., & Sharma, K. (2016). “An Empirical Study on Capital Structure in Indian Manufacturing Sector.” *Global Business Review*, 17(2), 1–14.

Dakua, S. (2018). “Effect of determinants on financial leverage in Indian steel industry: A study on capital structure.” *International Journal of Finance and Economics*, 24(1), 427-436.

Faris, A. M. (2011). “The determinants of capital structure of Palestine listed companies.” *Journal of Risk Finance*, 12(3), 226-241.

George, A., Nikolaous, A., Arman, G., & Ilias, V. (2020). “Corporate financial leverage and M&As choices: Evidence from the shipping industry.” *Transportation Research Part E: Logistics and Transportation Review*, 133(1), 101828.

Gweyi, M., & Karanja, J. (2014). “Effect of Financial Leverage on Financial Performance of Deposit Taking Savings and Credit Co-operative in Kenya.” *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 4(2), 176–184.

Harford, J., Klasa, S., & Walcott, N. (2009). "Do firms have leverage targets? Evidence from acquisitions." *Journal of Finance and Economics*, 93(1), 1-14.

Hassan, M. K., Rabbani, M. R., & Ali. M. A. M. (2020). "Challenges for the Islamic Finance and banking in post COVID era and the role of Fintech." *Journal of Economic Cooperation and Development*, 41(3), 93-116.

Indrawan, I. W., & Rahman, M. P. (2020). "Sectoral analysis on the impact of Islamic banks on the Malaysian economy." *Journal of Islamic Monetary Economics and Finance*, 6(1), 163-188.

Jensen, M., & Meckling, W. (1976). "Theory of the firm: managerial behaviour, agency cost and the ownership structure." *Journal of Financial Economics*, 2(1), 305-360.

Johnson, S., & Mitton, T. (2003). "Cronyism and capital controls: Evidence from Malaysia." *Journal of Financial Economics*, 67(2), 351–382.

Karim, S. (2021a). "An investigation into the remuneration-CSR nexus and if it can be affected by board gender diversity." *Corporate Governance: The International Journal of Business in Society*, DOI 10.1108/CG-08-2020-0320

Karim, S. (2021b). "Do women on corporate boardrooms influence the remuneration patterns and socially responsible practices? Malaysian Evidence." *Equality, Diversity, and Inclusion: An International Journal*, DOI 10.1108/EDI-07-2020-0213

Karim, S., Manab, N. A., & Ismail, R. B. (2019). "Legitimising the role of corporate boards and corporate social responsibility on the performance of Malaysian Listed Companies." *Indian Journal of Corporate Governance*, 12(2), 125-141.

Karim, S., Manab, N. A., & Ismail, R. B. (2020 a). "Assessing the governance mechanisms, corporate social responsibility and performance: The moderating effect of board independence." *Global Business Review*, DOI:10.1177/0972150920917773

Karim, S., Manab, N. A., & Ismail, R. B. (2020 b). "The interaction effect of independent boards on CG-CSR and performance nexus." *Asian Academy of Management Journal*, 25(1), 61-84.

- Karim, S., Manab, N. A., & Ismail, R. B. (2020 c). "The dynamic impact of board composition on CSR practices and their mutual effect on organizational returns." *Journal of Asia Business Studies*, 14(4), 463-479.
- Kayo, E., & Kimura, H. (2011). "Hierarchical determinants of capital structure." *Journal of Banking & Finance*, 35(2), 358-371.
- Kazekami, S. (2017). "Do service sectors need core sectors to improve their productivity?" *Eurasian Economic Review*, 7(1), 389-410.
- Khemiri, W., & Noubbigh, H. (2018). "Determinants of capital structure: Evidence from Sub-Saharan African firms." *The Quarterly Review of Economics and Finance*, 70(1), 150-159.
- Kila, M., Wan Mahmood, W. M., Suhaila, & Mansor, W. (2008). "Capital Structure and Firm Characteristic: Some Evidence From Malaysia Companies." *Munich Personal RePEc Archive*, (14616), 1-17.
- Kumar, S., & Rao, P. (2016). "Financing patterns of SMEs in India during 2006 to 2013: an empirical analysis." *Journal of Small Business and Entrepreneurship*, 28(2), 97-131.
- Kwarbai, Jerry, D., Olayinka, I., Ajibade, A., & Ogundajo. (2016). "Leverage Analysis and Corporate Earnings: A Study of Food and Beverage Firms in Nigeria." *Journal of Accounting and Financial Management*, 2(4), 28-42.
- Lee. (2015). "Does Size Matter in Firm Performance? Evidence from US Public Firms." *International Journal of The Economics of Business*, 16(2), 189-203.
- Masor, N. (2017). "Determinants of Capital Structure: Evidence From Malaysian SMEs." Master thesis from University Utara Malaysia, 1-73.
- Mramor, D., & Črnigoj, M. (2009). "Determinants of Capital Structure in Emerging European Economies: Evidence from Slovenian Firms." *Emerging Markets Finance and Trade*, 45(1), 72-89.
- Myers, S. C., & Majluf, N. S. (1984). "Corporate financing and investment decisions when firms have information that investors do not have." *Journal of Financial Economics*, 13(2), 187-221.
- Myers, S. C. (1984). "The Capital Structure Puzzle Revisited." *The Review of Financial Studies*, 39(3), 575-592.

Nejad, N. R., & Wasiuzzaman, S. (2015). "Multilevel Determinants of Capital Structure: Evidence from Malaysia." *Global Business Review*, In press.

Ni'mah, A., Laila, N., Rusmita, S. A., & Cahyono, E. F. (2020). "Determinants of corporate bond and sukuk ratings in Indonesia." *Journal of Islamic Monetary Economics and Finance*, 6(3), 689-712.

Nisha, N., & Ghosh, B. (2018). "Causal relationship between leverage and performance: exploring Dhaka Stock Exchange." *International Journal of Business and Globalisation*, 20(1), 31-49.

Ogbulu, O., & Emeni, F. (2012). "Determinants of Corporate Capital Structure in Nigeria." *International Journal of Economics and Management Sciences*, 1(10), 81-96.

Omran, M., & Pointon, J. (2009). "Capital structure and firm characteristics: an empirical analysis from Egypt." *Review of Accounting & Finance*, 8(4), 454-474.

Pfeffermayr, M., Stockl, M., & Winner, H. (2008). "Capital structure, corporate taxation and firm age." Austrian Institute of Economic Research Working Paper. Retrieved from http://www.sbs.ox.ac.uk/centres/tax/Documents/working_papers/WP0829.pdf

Plecher, H. (2020, January 8). "Share of economic sectors in the GDP in Malaysia 2018." Retrieved from Statista: <https://www.statista.com/statistics/318732/share-of-economic-sectors-in-the-gdp-in-malaysia/>

Pouraghajan, A., Malekian, E., Emamgholipour, M., Lotfollahpour, V., & Bagheri, M. (2012). 'The Relationship between capital structure and firm performance evaluation measures: evidence from the Tehran Stock Exchange." *International Journal of Business and Commerce*, 1(9), 166-181.

Rabbani, M.R. (2021). "COVID-19 and its impact on supply chain financing and the role of Islamic Fintech: Evidence from GCC countries." *International Journal of Agile Systems and Management (IJASM)*, In press.

Rabbani, M.R., Bashar, A., Nawaz, N., Karim, S., Ali, M.A.M., Rahiman, H.U., & Alam, M.S. (2021). "Exploring the role of Islamic Fintech in combating the after-shocks of COVID-19: The open social

innovation of the Islamic financial system.” *Journal of Open Innovation: Technology, Market, and Complexity*, In press.

Rabbani, M.R., Khan, S., & Atif, M. (2021). “Machine Learning based P2P Lending Islamic FinTech Model for Small and Medium Enterprises (SMEs) in Bahrain.” *International Journal of Business Innovation and Research*, In press.

Rajan, R., & Zingales, L. (1995). “What do we know about capital structure? Some evidence from international.” *The Journal of Finance* 1(5), 1421-1460.

Roodman, D. (2009). “A note on the theme of too many instruments.” *Oxford Bulletin of Economics and Statistics*, 71(1), 135-58.

Roslee, N. N. (2017). “The effect of company-Specific Factors on Financial Leverage: Evidence from Industrial Sector Malaysia.” Master Thesis of University Utara Malaysia, 1-71.

Rouf, M. (2018). “Corporate characteristics and leverage: evidence from Bangladesh.” *PSU Research Review*, 2(1), 96-104.

Sabir, M., & Malik, Q. (2012). “Determinants of capital structure : A study of oil and gas sector of Pakistan.” *Interdisciplinary Journal of Contemporary Research in Business*, 3(1), 396-400.

Sanusi, N. (2014). “The dynamics of capital structure in the presence of zakat and corporate tax.” *International Journal of Islamic and Middle Eastern Finance and Management*, 7(1), 89–111.

Sheikh, N. A. and Karim, S. (2016). “Determinants of profitability of Islamic commercial banks: evidence from Pakistan.” *Pakistan Journal of Islamic Research*, 17(1), 71-78.

Sheikh, N. A. and Karim, S. (2015). “Effects of internal governance indicators on performance of commercial banks in Pakistan.” *Pakistan Journal of Social Sciences*, 35(1), 77-90.

Sheikh, N. A. and Kareem, S. (2015). “The impact of board structure, ownership concentration and CEO remuneration on performance of Islamic commercial banks in Pakistan.” *Pakistan Journal of Islamic Research*, 15(1), 49-59.

Sheikh, N. A., & Wang, Z. (2011). “Determinants of capital structure: An empirical study of firms in manufacturing industry of Pakistan.” *Managerial Finance*, 37(2), 117-133.

- Silva, J. (2020). "Impact of public and private sector external debt on economic growth: the case of Portugal." *Eurasian Economic Review*, 10(1), 607-634.
- Suto, M. (2003). "Capital Structure and Investment Behaviour of Malaysian Firms in the 1990s: a study of corporate governance before the crisis." *Corporate Governance*, 11(1), 25-39.
- Ting, I., Azizan, N., & Kweh, Q. (2015). "Upper Echelon Theory Revisited: The relationship between CEO Personal Characteristics and Financial Leverage Decision." *Procedia - Social and Behavioral Sciences*, 195(1), 686 – 694.
- Ting, W. (2016). "Estimating Dynamic Panel Model of Leverage Decision: Evidence from Malaysia." *Procedia Economics and Finance*, 35(1), 267 – 273.
- Uyar, A., & Guzelyurt, M. (2015). "Impact of firm characteristics on capital structure choice of Turkish SMEs." *Managerial Finance*, 41(3), 286–300.
- Viviani, J. (2008). "Capital structure determinants: an empirical study of French companies in the wine industry." *International Journal of Wine Business Research*, 20(2), 171–194.
- Vo, X. V. (2016). "Determinants of capital structure in emerging markets: Evidence from Vietnam." *Research in International Business and Finance*, 40(1), 105-113.
- Welch, I. (2004). "Capital Structure and Stock Returns." *Journal of Political Economy*, 112(1), 106-131.
- Wiwattanakantang, Y. (1999). "An empirical study on the determinants of the capital structure of Thai firms." *Pacific-Basin Finance Journal*, 7(1), 371–403.
- Wooldridge, J. (2002). *Econometric analysis of cross section and panel data*. Cambridge, MA: MIT Press.
- Yahaya, A., Mahat, F., & Matemilola, B. T. (2020). "Bank regulatory capital and performance: evidence from Sub Saharan Africa." *Journal of Economic Cooperation and Development*, 41(1), 31-60.
- Zare, R., Farzanfar, F., & Boroumand, M. (2013). "Examining the Firm Age, Size and Asset Structure Effects on Financial Leverage in the Firms Listed in Tehran Stock Exchange." *International Journal of Economy, Management and Social Sciences*, 2(6), 256–264.



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