CRUDE OIL, NATURAL GAS, POLITICS, AND ECONOMIC GROWTH: IMPACT AND CAUSALITY ANALYSIS IN CASPIAN SEA REGION

Master's Thesis

S M Rashed JAHANGIR

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S M Rashed JAHANGIR

MASTER'S THESIS

Department of Business Administration

Supervisor: Assist. Prof. Dr. Betül YÜCE DURAL

Eskişehir
Anadolu University, Graduate School of Social Science
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FINAL APPROVAL FOR THESIS

This thesis titled "**Crude Oil, Natural Gas, Politics, and Economic Growth: Impact and Causality Analysis in Caspian Sea Region**" has been prepared and submitted by **S. M. Rashed JAHANGIR** in partial fullfillment of the requirements in "**Anadolu University Directive on Graduate Education and Examination**" for the Master of Arts **Department of Business Administration (International Business)** has been examined and approved on **21/12/2017.**

Committee Members	**Signature**
Member (Supervisor)	: Assist.Prof.Dr.Betül YÜCE DURAL
Member	: Assoc.Prof.Dr.Murat ERTUĞRUL
Member	: Assoc.Prof.Dr.Umut KOÇ

21/12/2017
Date

Prof.Dr.Emel SIKLAR
Graduate School of Social Sciences

ABSTRACT

CRUDE OIL, NATURAL GAS, POLITICS, AND ECONOMIC GROWTH: IMPACT AND CAUSALITY ANALYSIS IN CASPIAN SEA REGION

S M Rashed JAHANGIR

MBA in International Business

Anadolu University, Graduate School of Social Science, December 2017

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The main objective of this study is to investigate the impact and causality of crude oil and natural gas with economic growth in Caspian Sea region. Alongside, analyzing the impact and causality of regional politics with crude oil and natural gas, and investigating the internal strengths and weaknesses as well as external opportunities and threats of the region are also the significant purposes of the study. Here, the study uses ordinary least square method and Granger causality test by considering time-series data from 1997-2015 to ascertain the impact and causality of crude oil, natural gas, politics, and economic growth. The results show that crude oil and natural gas has a significant impact on economic growth of the region. However, no significant regression model has been found considering the political variables which jointly has a significant impact on crude oil and natural gas. Now, considering Granger causality, from the economic perspective, GDP does granger cause crude oil price and export. It denotes that there is a unidirectional causal relationship between GDP and crude oil price, and GDP and crude oil export. Surprisingly, this direction is unlike for GDP and natural gas. Here, GDP and natural gas have opposite but unidirectional causal relationship—i.e., natural gas price and export do Granger cause GDP. On the other hand, considering political perspective, the findings of the Granger causality test show seven pairs which have a unilateral significant causal relationship between them.

Keywords: Caspian Sea Region, Crude Oil, Natural Gas, Politics, Economic Growth

ÖZET

HAM PETROL, DOĞAL GAZ, SİYASET VE EKONOMİK BÜYÜME: HAZAR DENİZİ BÖLGESİ'NİN ETKİ VE NEDENSELLİK ANALİZİ

S M Rashed JAHANGIR

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Danışman: Yrd. Doç. Dr. Betül YÜCE DURAL

Bu çalışmanın temel amacı, Hazar Denizi bölgesindeki ham petrol ve doğal gazın ekonomik büyümeyle olan etkisini ve nedenselliğini araştırmaktır. Ayrıca, bölgesel siyasetin ham petrol ve doğal gazla olan etkisini ve nedenselliğini analiz etmek ve bölgenin güçlü ve zayıf yanlarını, dış fırsat ve tehditlerini araştırmakta çalışmanın önemli amaçlarındandır. Bu çalışmada ham petrol, doğalgaz, siyaset ve ekonomik büyümenin etkisini ve nedenselliğini saptamak için 1997-2015 yılları arasındaki zaman serisi verileri göz önüne alınarak sıradan en küçük kareler yöntemi ve Granger nedensellik testi kullanılmaktadır. Sonuçlar, ham petrol ve doğalgazın bölgenin ekonomik büyümesi üzerinde önemli bir etkiye sahip olduğunu gösteriyor. Bununla birlikte, doğalgaz ve ham petrol üzerinde önemli bir etkiye sahip olan politik değişkenler dikkate alındığında belirgin bir gerileme modeli bulunmamıştır. Şimdi, Granger nedenselliği testini göz önüne alırsak, ekonomik perspektiften, GSYİH, ham petrol fiyatını ve ihracatını etkiliyor. Bu durum, GSYİH ile ham petrol fiyatı ve GSYİH ile ham petrol ihracatı arasında tek yönlü nedensel bir ilişki olduğuna işaret etmektedir. Şaşırtıcı bir şekilde, bu yön, GSYİH ve doğalgaz arasında farklıdır. Burada, GSYİH ve doğalgaz zıt fakat tek yönlü nedensel ilişkiye sahiptir yani; doğalgaz fiyatı ve ihracat GSYİH'da Granger nedenselliğine neden olur. Öte yandan, siyasal perspektif göz önüne alındığında, Granger nedensellik testinin bulguları, aralarında tek taraflı anlamlı bir nedensel ilişki bulunan yedi çifti göstermektedir.

Anahtar kalimeler: Hazar Denizi Bölgesi, Ham Petrol, Doğalgaz, Siyaset, Ekonomik Büyüme

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21/12/ 2017

STATEMENT OF COMPLIANCE WITH ETHICAL PRINCIPLES AND RULES

I hereby truthfully declare that this thesis is an original work prepared by me; that I have behaved in accordance with the scientific ethical principles and rules throughout the stages of preparation, data collection, analysis and presentation of my work; that I have cited the sources of all the data and information that could be obtained within the scope of this study, and included these sources in the references section; and that this study has been scanned for plagiarism with "scientific plagiarism detection program" used by Anadolu University, and that "it does not have any plagiarism" whatsoever. I also declare that, if a case contrary to my declaration is detected in my work at any time, I hereby express my consent to all the ethical and legal consequences that are involved.

(Signature)

S M Rashed JAHANGIR

TABLE OF CONTENTS

TITLE PAGE ..... **i**
FINAL APPROVAL FOR THESIS ..... **ii**
ABSTRACT ..... **iii**
ÖZET ..... **iv**
ACKNOWLEDGEMENT ..... **v**
STATEMENT OF COMPLIANCE WITH ETHICAL PRINCILES AND RULES ..... **vi**
TABLE OF CONTENTS ..... **vii**
LIST OF TABLES ..... **x**
LIST OF GRAPHS ..... **xi**
LIST OF ABBREVIATIONS ..... **xii**
CHAPTER ONE **1**
1. INTRODUCTION **1**
1.1. Overview **1**
1.2. Problem Statement of the Study **10**
1.3. Significant of the Study **11**
1.4. Research Questions **13**
1.5. Objectives of the Study **14**
1.6. Limitations of the Study **14**
1.7. Hypotheses of the Study **14**
1.7.1. Economic perspective **15**
1.7.2. Political perspective **15**
1.8. Definitions **16**
CHAPTER TWO **18**
2. LITERATURE REVIEW **18**
2.1. Introduction **18**
2.2. Economic Aspects **18**
2.3. Political Aspects **24**
2.4. Overview of Caspian Sea Region **27**

2.4.1. Economic overview of Caspian Sea region based on crude oil and natural gas....28
2.4.2. Political overview of Caspian Sea region....44
2.4.3. Major Caspian crude oil and natural gas pipelines....46
CHAPTER THREE....49
3. METHODOLOGY....49
3.1. Introduction....49
3.2. Data Collection....49
3.3. Data Calculation....50
3.4. Variables Measurement and Explanation....51
3.5. Data Processing Framework....52
3.6. Test for Stationarity: Unit Root Test....52
3.6.1. Augmented Dickey-Fuller (ADF) test....53
3.7. Regression Analysis....54
3.7.1. Ordinary Least Square (OLS)....54
3.8. Granger causality Test....57
3.9. Analysis Tools....59
CHAPTER FOUR....60
4. FINDINGS AND ANALYSIS....60
4.1. Introduction....60
4.2. Unit Root Test Results for Stationarity....60
4.2.1. Discussion....61
4.3. Regression Analysis....63
4.3.1. Economic perspectives....64
4.3.2. Political perspectives....67
4.4. Granger Causality Analysis....73
4.4.1. Economic perspective....73
4.4.2. Political perspective....76
4.5. Economic and Political Variables with no Granger Cause....80
4.6. SWOT ANALYSIS....82
CHAPTER FIVE....86

5. CONCLUSION 86
5.1. Introduction 86
5.2. Overall Findings and Discussions 88
5.3. Recommendations 90
5.4. Final Remarks 92
REFERENCES 93
APPENDIXES

LIST OF TABLES

Table 1.1. Caspian basins proved and probable reserves 7
Table 1.2. Production of crude oil (2012) and gross production of natural gas (2011) 8
Table 2.1. Key pipelines route from Caspian Sea region 47
Table 4.1. Augmented Dickey-Fuller (ADF) test results 61
Table 4.2. Regression analysis of GDP and crude oil variables 64
Table 4.3. Regression analysis of GDP and natural gas variables 65
Table 4.4. Regression analysis of crude oil production and political variables 67
Table 4.5. Regression analysis of crude oil price and political variables 68
Table 4.6. Regression analysis of crude oil price and political variables 69
Table 4.7. Regression analysis of natural gas production and political variables 70
Table 4.8. Regression analysis of natural gas price and political variables 71
Table 4.9. Regression analysis of natural gas export and political variables 72
Table 4.10. Granger Causality test of GDP and crude oil price 73
Table 4.11. Granger Causality test of GDP and crude oil export 74
Table 4.12. Granger Causality test of GDP and natural gas price 74
Table 4.13. Granger Causality test of GDP and natural gas export 75
Table 4.14. Granger Causality test of crude oil production and political stability 76
Table 4.15. Granger Causality test of crude oil price and political stability 76
Table 4.16. Granger Causality test of crude oil price and government effectiveness 77
Table 4.17. Granger Causality test of crude oil export and government effectiveness 77
Table 4.18. Granger Causality test of crude oil production and political stability 78
Table 4.19. Granger Causality test of natural gas price and political stability 78
Table 4.20. Granger Causality test of natural gas export and control of corruption 79
Table 4.21. List of no pairwise granger cause in economic and political variables 80
Table 4.22. SWOT analysis of the Caspian Sea region 82

LIST OF GRAPHS

Graph 1.1. Percentage of crude oil production by region in 2015 3
Graph 1.2. Percentage of natural gas production by region in 2015 4
Graph 1.3. Percentage of crude oil export by region in 2015.....4
Graph 1.4. Percentage of natural gas export by region in 2015 5
Graph 2.1. Crude oil and Natural gas reserve of Azerbaijan from 1997 to 2015.....29
Graph 2.2. Crude oil and Natural gas production in Azerbaijan from 1997 to 2015 30
Graph 2.3. Crude oil and Natural gas export in Azerbaijan from 1997 to 2015 31
Graph 2.4. Crude oil and Natural gas reserve of Iran from 1997 to 2015.....32
Graph 2.5. Crude oil and Natural gas production in Iran from 1997 to 2015 33
Graph 2.6. Crude oil and Natural gas export in Iran from 1997 to 2015 34
Graph 2.7. Crude oil and Natural gas reserve of Kazakhstan from 1997 to 2015.....35
Graph 2.8. Crude oil and Natural gas production in Kazakhstan from 1997 to 2015.....36
Graph 2.9. Crude oil and Natural gas export in Kazakhstan from 1997 to 2015 37
Graph 2.10. Crude oil and Natural gas reserve of Russia from 1997 to 2015.....38
Graph 2.11. Crude oil and Natural gas production in Russia from 1997 to 2015 39
Graph 2.12. Crude oil and Natural gas export in Russia from 1997 to 2015 40
Graph 2.13. Crude oil and Natural gas reserve of Turkmenistan from 1997 to 2015.....41
Graph 2.14. Crude oil and Natural gas production in Turkmenistan from 1997 to 2015 ...42
Graph 2.15. Crude oil and Natural gas export in Turkmenistan from 1997 to 2015.....43

LIST OF ABBREVIATIONS

ADF	Augmented Dickey-Fuller
CC	Control of Corruption
EIA	Energy Information Administration
EU	European Union
FSU	Former Soviet Union
GC	Granger Causality
GDP	Gross Domestic Product
GE	Government Effectiveness
IEA	International Energy Agency
IRF	Impulse Response Function
ITC	International Trade Center
KWES	Key World Energy Statistics
MENA	Middle East and North Africa
NATO	North Atlantic Treaty Organization
NIOC	National Iranian Oil Company
OECD	Organization for Economic Cooperation and Development
OLS	Ordinary Least Square
OPEC	Organization of the Petroleum Exporting Countries
SOCAR	The State Oil Company of Azerbaijan Republic
SWOT	Strength, Opportunities, Weakness, and Threat
TAPI	Turkmenistan–Afghanistan–Pakistan–India Pipeline
USD	United States Dollar
USGS	United States of Geological Survey

CHAPTER ONE

1. INTRODUCTION

1.1. Overview

Energy acts as a lifeblood of the global modern economy whereas oil and natural gas capture most of its area (Trench & Miesner, 2006, p. 10). It is a crucial input for most of the goods and services and has an enormous impact on people's regular life. For that reason, millions of people's living standards oscillate when the price of energy becomes unstable and unreasonable. As with people, countries which economy totally or partially depend on energy also experience economic hardship with the lackadaisical behavior of energy price. This sluggish energy price has an enormous impact on economic growth of a country (Bayraktar, Taha & Yildiz, 2016, p. 14). Various kinds of energy denominations have in our world such as crude oil, natural gas, coal, electricity, solar and so on. Among them, crude oil and natural gas are the main driving force, especially oil which has been dominating the energy market as a major commercial energy since the downturn of the coil and as numerous studies suggest that it will be continuing its realm over the Twenty-first century. In 2002, around 40% of world energy mix was possessed by oil, whereas around 25% of commercial energy by natural gas. However, reportedly, it would turn to 36.9% and 29.9% for oil and natural gas respectively in 2025 (Rahman, 2004, p. 8). According to International Energy Agency (IEA), Key World Energy Statistics (KWES) 2016, on the one hand, crude oil accounted for 33.3% of the world[1] total primary energy supply in 2014. On the other hand, natural gas accounted for 21.2% of the world total primary energy supply. Now considering consumption, oil contributed 39.9% in the world final consumption in 2014 whereas natural gas only 15.1%. This consumption and supply depend on how much production oil and natural gas has all over the world.

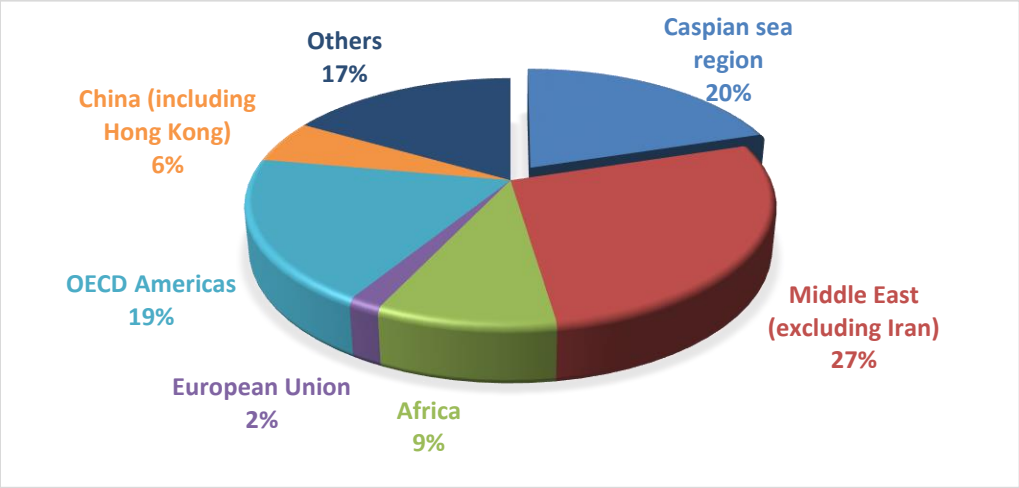
The International Energy Agency divides the world into different regions in the KWES report—OECD, Middle East, Africa, Non-OECD Europe and Eurasia, China, Asia and Non-OECD Americas. In 2015, Middle East was the largest producer of crude oil in the world; it possessed 31.5% crude oil[2] whereas considering the second and third position,

[1] World includes international aviation and international marine bunkers.
[2] It includes crude oil, NGL, feedstocks, additives and other hydrocarbons.

25.3% possessed by OECD block, and Non-OECD Europe and Eurasia accounted for 15.8% respectively. Rest of the percentage of production was possessed by block as follows: Non-Americas (9.4%), Africa (9.1%), China (5.0%), and Asia (3.9%). Now, considering the natural gas, OECD was ahead of natural gas production, it obtained 36.4% of world natural gas production in 2015. Non-OECD Europe and Eurasia was the second highest producer; it produced 24.2% of natural gas. The Middle East produced 16% of natural gas and remained as the third largest producer in the world. As with crude oil production, Asia (9.0%), Africa (5.8%), Non-Americas (49%) and China (3.7%) accounted for the rest of the percentage of the natural gas production in 2015.

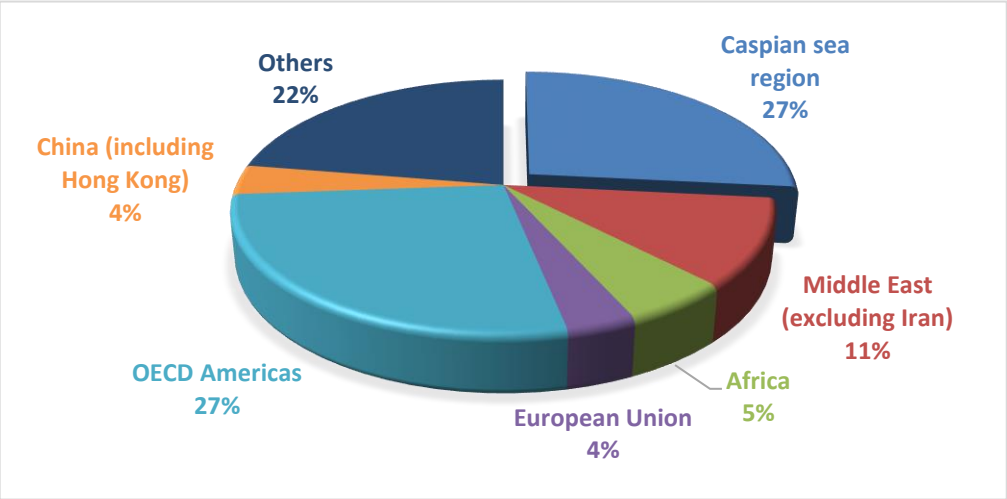
Oil and natural gas play an important role in the world economy and politics. Most of the aspects of our lives are directly or indirectly related to the energy; especially, crude oil and natural gas. A study on China's macroeconomic found that oil price affects the economic growth significantly (Du, Yanan & Wei, 2010, p. 9). An abundance of crude oil and natural gas is an economic strength for a country because of its necessity in our regular life–e.g., transportation fuel, petroleum products and so on. So, it is a blessing for a country in that sense. According to Henry Kissinger, the former national security advisor of the United States, "Control oil and you control nations; control food and you control the people." Now, due to the ample demand for oil and gas, the reserve of these resources is declining day by day, though discovering new crude oil and natural gas field is continuing. Nonetheless, this demand for crude oil and natural gas leads the crude oil and natural gas affluent countries huge advantages for their economy, but, perhaps, it may no longer be same if there are no alternatives for it. Countries like Kuwait, Saudi Arabia, Azerbaijan, Russia, and Kazakhstan are mostly depended on fuel economic growth (Hazarika, 2016, p. 1). Most of the countries around the world satisfy their oil and gas needs from some specific regions or countries such as Persian Gulf, Caspian Sea, North America, South America, and North Africa and so on. Needless to say, the Persian Gulf and Caspian Sea region are strategically and geopolitically most important for the world's crude oil and natural gas demand because of their crude oil and natural gas cornucopia and geographical position. For these reasons, the international energy politics inextricably related to the Caspian Sea region. Historically, after the breaking up of the Soviet Union, the Caspian Sea

region has been experiencing a radical change. It is becoming internationalized to an extent not seen before, and a major reconfiguration of power and influence is taking place. Crumbling Russia's role and weakening influence in the Caucasus and in Central Asia since 1991 have opened the doors for external actors to engage in the region. In that continuation, the possibility for the exploitation of crude oil and natural gas in the region has raised the stakes of external actors (Jonson, 2001, p. 1). Verily, the Caspian Sea region has a significant contribution in the world crude oil and natural gas production and export. The world proportion of crude oil and natural gas production and export are as follows:



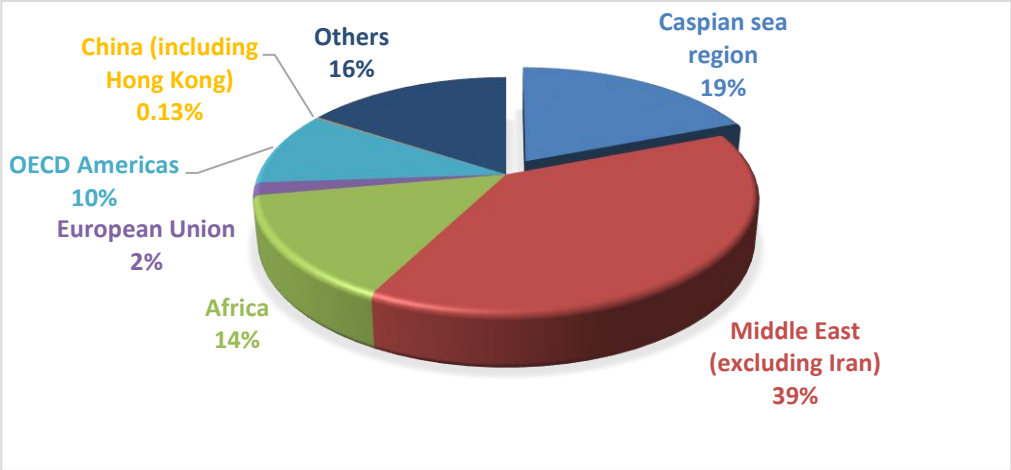
Graph 1.1. *Percentage of crude oil production by region in 2015*
Source: *International Energy Agency (authors' computation)*

The graph 1.1 represents the percentage of production of crude oil by different regions. Here, Caspian Sea region holds the second highest position among the regions and exploited a significant amount—20%—of crude oil considering world crude oil production in 2015. Alongside, in the meantime, Middle East (excluding Iran) produced 27%, OECD Americas 19%, Africa 9%, European Union 2%, China (including Hong Kong) 6%, and rest of others produced 17% respectively.



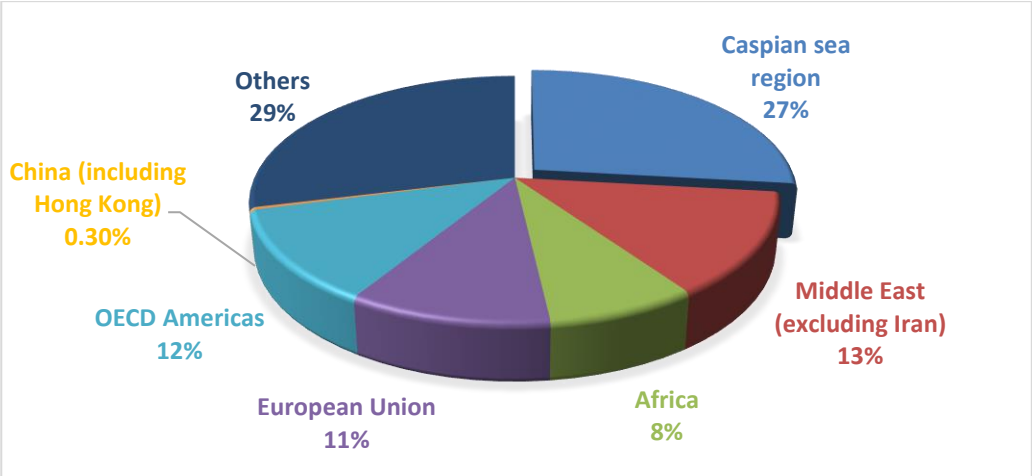
Graph 1.2. *Percentage of natural gas production by region in 2015*
Source: *International Energy Agency (authors' computation)*

The graph 1.2 demonstrates the proportion of producing natural gas of different regions in the world. As the graph shows, the Caspian Sea captured the biggest part of the pie and became the topmost region which produced the highest amount of natural gas—around 27%—in 2015. In the meantime, OECD Americas became the second largest producer of natural gas. Importantly, the Middle East which is prominent for crude oil also produced a significant amount of natural gas that is around 11% of the total world production.



Graph 1.3. *Percentage of crude oil export by region in 2015*
Source: *International Energy Agency (authors' computation)*

The graph 1.3 illustrates the percentage of the total export of crude oil by region in the world. It denotes the Middle East as the largest exporter of crude oil in the world which exported more than two-thirds of world's total crude oil export, around 39%, in 2015. Alongside, the Caspian Sea region became the second largest exporter in that time and exported around 19% of world total crude oil. Here, it is noticeable that China (including Hong Kong) exported only 0.1364% which is nearly zero percent of the world's total export of crude oil.



Graph 1.4. *Percentage of natural gas export by region in 2015*
Source: *International Energy Agency (authors' computation)*

Finally, the graph 1.4 shows the proportion of natural gas export by region in the world. As with the highest producer of natural gas, the Caspian Sea region also exported the highest amount of natural gas in 2015 which is almost one-third of world's total natural gas export. Alongside, interestingly, most of the other regions exported proportionately similar amounts of natural gas in the same year. But, as with crude oil export, China (including Hong Kong) also exported nearly zero amount of natural gas—around 0.3073%—in 2015.

The Caspian Sea is a landlocked body of water between Europe and Asia surrounded by five littoral (coastal) countries—the southwest by Azerbaijan, south by Iran, northeast by Kazakhstan, southeast by Turkmenistan and the northwest by Russia—border inland sea. This is an important region in the world mostly for its abundance of energy resources, especially crude oil and natural gas. Actually, after the collapse of the Soviet Union, three countries: Azerbaıjan, Kazakhstan, and Turkmenistan, became the independent nations. The Caspian Sea is the oldest region of oil production in the world; it is an important participant in the world energy market and politics. Due to the abundance of oil and natural gas reserve it has got international attention and penetrated in international politics (Yergin 2012, p. 44). As with the production of oil, the production of natural gas is also growing significantly. This contribution of natural gas was predicted in 1996, when a study on "oil and gas in the Caspian Sea region" found that the abundance amount of oil and natural gas deposit will make the Caspian Sea comparable with the dominant oil and gas region, especially Persian Gulf, North Africa and western Siberia (Feller, 1996, p. 39). For that reason, external dominant actors in the world have a closer look at the region, especially the United States which pays more attention to the Caspian Sea region. The main reason for paying more attention to the region is the disunity among the countries (Bayramov, 2015, para. 3).

Caspian Sea region contains large volumes of crude oil and natural gas reserves both in offshore deposits in the Caspian Sea and onshore fields in Caspian basin. As with reserve, it exploits a significant volume of crude oil and natural gas. The U.S Energy Information Administration estimated (2012) that the Caspian basin area contains approximately 48 billion barrels of oil and 285 trillion cubic meters of gas in proven or probable reserves (Table-1). Amid this reserve, 75% of crude oil and 67% of natural gas situated within 100 miles of coastal area. In addition, the United States Geological Survey (USGS) estimated that Caspian Sea region has a mean of approximately 20 billion barrel of undiscovered[3] oil resources and 243 trillion cubic feet of undiscovered natural gas resources. It also estimated that around 61% of undiscovered oil and 81% of natural gas is located in the south of Caspian basin. On the other hand, the production of crude oil in

[3] Undiscovered resources mean the resources technically recoverable

Caspian basin area approximately 2.6 million per day which is accounted for 3.4% of world supply. As with crude oil, it produced approximately 2.5 billion cubic feet per year.

Table 1.1. *Caspian basins proved and probable reserves*

Country	Crude oil and lease condensate (billion bbl)	Natural gas (Tcf)
Azerbaijan	**8.5**	**51**
Offshore Caspian[4]	6.8	46
Onshore Caspian[5]	1.7	5
Iran	**0.5**	**2**
Offshore Caspian	0.5	1
Onshore Caspian	*(s)	1
Kazakhstan	**31.2**	**104**
Offshore Caspian	15.7	36
Onshore Caspian	15.5	68
Russia	**6.1**	**109**
Offshore Caspian	1.6	14
Onshore Caspian	4.5	95
Turkmenistan	**1.9**	**19**
Offshore Caspian	1.1	9
Onshore Caspian	0.8	10
TOTAL CASPIAN	**48.2**	**285**
Offshore Caspian	19.6	106
Onshore Caspian	28.6	179

Source: *U.S. Energy Information Administration, IHS EDIN, Eastern Bloc Research Energy Databook 2012*
**(s) = the value is trivial means too small to for the number of decimal places.*

The above table illustrates the proved and probable reserve of crude oil and natural gas in Caspian basin (not the countries' total reserve and probable reserve) which abut with the Caspian Sea. Considering the proportion of crude oil and natural gas reserve and probable reserve, Kazakhstan has the highest amount of crude oil reserve—around two-third—and Russia has highest natural gas in Caspian basin. Likewise, Azerbaijan has a significant amount of crude oil and natural gas reserve in Caspian basin. It is notable that maximum portion of natural gas reserve in Azerbaijan is offshore where Kazakhstan's

[4] Offshore Caspian refers to fields in the Caspian Sea.
[5] Onshore Caspian refers to fields in Caspian basins that are not offshore.

natural gas reserve double in onshore compare to offshore. In addition, Iran has a trivial amount of oil and natural gas reserve and probable reserve in Caspian basin.

Table 1.2. *Production of crude oil (2012) and gross production of natural gas (2011)*

Country	Crude oil (thousand barrels per day)	Natural gas (billion cubic feet per year)
Azerbaijan	**922**	**745**
Offshore Caspian	890	562
Onshore Caspian	32	183
Iran	**0**	**0**
Offshore Caspian	0	0
Onshore Caspian	0	0
Kazakhstan	**1,387**	**1,025**
Offshore Caspian	3	*(s)
Onshore Caspian	1,384	1,025
Russia	**120**	**485**
Offshore Caspian	6	17
Onshore Caspian	114	468
Turkmenistan	**216**	**284**
Offshore Caspian	46	1
Onshore Caspian	170	283
TOTAL CASPIAN	**2,645**	**2,539**
Offshore Caspian	945	580
Onshore Caspian	1700	1959

Source: *U.S. Energy Information Administration, IHS EDIN, Eastern Bloc Energy, Rigzone, Rystad Energy*
**(s) = the value is trivial means too small to for the number of decimal places.*

Table 1.2 represents the production of crude oil and natural gas of Caspian Sea region. As the reserve, Kazakhstan produced the highest amount of crude oil and natural gas, and it accounted for around half of the Caspian basin production. Among the production, most of Kazakhstan's crude oil and natural gas production is onshore production where offshore production nearly zero. As Kazakhstan, Russia and Turkmenistan also concentrate on onshore production. Importantly, Azerbaijan's crude oil and natural gas production are offshore. Azerbaijan produced a significant amount of crude oil and natural gas—second highest in Caspian basin. It is noticeable that Iran produces

neither crude oil nor natural gas from Caspian basin area, though it has oil and natural gas reserve in that area.

Due to this glut of oil and natural gas reserve and production, Caspian Sea region entices various countries which have a dearth of oil and natural gas but excessive demand. On the other hand, it also attracts countries that have a political interest in regarding this area; especially Russia, the USA, EU, and China are the main strategic players in this region. Russia concerns about this region because of its energy market monopoly. After collapsing the Soviet Union newly independent countries energy export mostly depends on Russia because of oil and natural gas pipelines. Russia is the biggest exporter in Europe energy market. According to European Commission, in 2007, the European Union imported around 185 million tons of crude oil and 100.7 million tons of oil equivalents of natural gas which accounted for 32.6% and 38.7% of total oil and natural gas import of EU respectively. Due to the monopoly of gas pipeline, Russia pays a low price for gas to Caspian Sea region countries, especially Turkmenistan and Kazakhstan which is below the world market price. The countries of Caspian Sea region aware about this treatment; however, they do not have enough political and economic strength to reach at a point of development where they can compete with the market in a global scale. So, the approach of breaking down this monopoly is bypassing the oil and gas pipelines (Blank, 2008, p. 75). Developing new pipeline, in other words, markets is the potential way to alleviate Russian influence on Caspian Sea region's oil and natural gas market. On the other hand, the USA is also a major strategic player in Caspian region; it is not because of oil and so-called democracy which is always asserted. The interest of USA on Caspian Sea region firstly because of its nature; preventing Russia's energy domination from the oil and gas market as well as isolating Iran from the Central Asian energy market (Blank, 2008, pp. 73-76). Finally, China's interest in the Caspian Sea is mainly because of domestic demand. According to Caspian report, China imports natural gas from Turkmenistan through Central Asia-China Gas Pipeline which started in 2006 and accounts for around 40 billion cubic meters natural gas per year. Recently, in 2013, they signed a new agreement by which China imports 25 billion cubic meters more natural gas, total 65 billion cubic meters, and it will continue until 2020.

Now considering the exporting destinations and other crucial countries for the Caspian Sea region, the maximum amount of crude oil and natural gas of the region export to West where Russia is the main intermediary. Here, a major portion of the oil and natural gas export via pipeline through Russia to European markets and a small amount of oil and gas pass via tanker through the Mediterranean Sea to European energy market (Gelb, 2005, para. 10). Along with Europe, Turkey is also an important importer for Caspian region. According to CIA Factbook, Turkey consumes more oil and natural gas than its production; its consumption is growing day by day. Needless to say, it already imports a significant amount of gas from Russia and it has a good relationship with other Caspian region's countries. Importantly, some significant Caspian region's gas pipelines enter European markets through Turkey such as Trans-Anatolian Natural Gas Pipeline (TANAP), Baku-Tbilisi-Ceyhan Pipeline and so on. For that reason, Turkey becomes an important player in the energy market and politics for Caspian Sea region. Finally, Japan, India, and Pakistan also import from Caspian region; their demand is increasing day by day. In that continuation, the proposed Trans-Afghanistan Pipeline—which will transport natural gas from Caspian region's Turkmenistan through Afghanistan to Pakistan and then India—will adjoin Caspian region with India and Pakistan. Now considering all the countries' significant demand for crude oil and natural gas as well as politics, Caspian Sea is becoming a more important player in the world energy market and politics.

1.2. Problem Statement of the Study

Caspian Sea region has an enormous influence on world energy markets and politics. It affects other countries' economy and politics related to the energy because of their dependency on Caspian region for the oil and natural gas. Due to the abundance of crude oil and natural gas reserve, Caspian Sea region pulled international attention on the region and penetrated in international politics (Yergin 2012, p. 44). Individually, there are numerous studies conducted on crude oil and natural gas impact on economic growth of Caspian Sea region's countries. But there is no such a study which explains the crude oil and natural impact on economic growth in the Caspian Sea region as a whole. Likewise, the influence of politics on oil and natural gas in Caspian region as a whole is also absent. This

paucity of study on the Caspian Sea region as a whole obscures the importance of crude oil and natural gas of the region to the world.

On the other hand, most of the studies considered crude oil and natural gas variables individually; e.g., price, production, and consumption, for analyzing the Caspian Sea region. In this continuation, a study on oil dependency of Russian economy found that though a large variation in oil price is responsible for the vulnerability of Russian economy, its economic growth is significant when there is an absence of oil price growth (Benedictow, Fjærtoft and Løfsnæs, 2013, p. 400). Alongside, the study on the relationship between oil production and GDP of Former Soviet Union (FSU) found that the decline of GDP in Soviet and former Soviet during the 1980s to 1990s did not Granger cause the decline in oil production, but there is a Granger cause when the pair is opposite—the decline in oil production did Granger cause the fall of GDP (Reynolds and Kolodziej, 2008, p. 271). On the other hand, a study on Iranian oil and gas sector for production and consumption policy found that the export of gas will reach around 500 or 620 million cubic meters per day considering various scenarios and export revenue may touch up to 500 billion USD by 2025 (Kiani and Pourfakhraei, 2010, p. 7764). Alongside, another study which is not related to Caspian Sea region found that natural gas has an effect on economic growth; the consumption of natural gas positively affects economic growth in Pakistan (Shahbaz, Lean & Farooq, 2013, p. 92). Now, like the above studies, most of the other studies about Caspian countries consider individual variable of crude oil and natural gas rather than using most prominent variables together which insinuates an ambiguity for accurate findings of the region.

This study deals with these two conspicuous problems and evaluates, one the one hand, the impact and causality of oil and natural gas on economic growth, on the other hand, the impact and causality of politics on oil and natural gas in the Caspian Sea region as a whole. Along with, it also considers most important variables of crude oil and natural gas—reserve, export, production, and price rather than using just one variable.

1.3. Significant of the Study

As mentioned before, Caspian Sea is the oldest region of oil production in the world; this area is blessed by crude oil and natural gas reserve. The glut of oil and natural gas

reserve and probable reserve made this area as the most important energy actor in the world. The U.S Energy Information Administration estimated (2012) that the Caspian basin area contains approximately 48 billion barrels of crude oil and 285 trillion cubic meters of natural gas of proven or probable reserves. On the other hand, the production of crude oil in Caspian basin area approximately 2.6 million per day which is accounted for 3.4% of world supply. As with crude oil, it produced approximately 2.5 billion cubic feet natural gas per year. This abundance of crude oil and natural gas reserve and production triggers the region to supply a significant amount of oil and natural gas to the world. Europe is one of the important energy markets for this region. According to European Commission, in 2007, the European Union imported around 185 million tons of crude oil and 100.7 million tons of oil equivalents of natural gas which accounted for 32.6% and 38.7% of total oil and natural gas import of EU respectively. Besides, European energy market is strategically important in the world energy politics because of the presence of International Atomic Energy Agency (IAEA) and International Energy Agency (IEA) headquarters (Bayramov, 2015, para. 1). Alone with European energy market, China imports a significant amount of crude oil and natural from this region due to fulfilling their domestic demand. In addition, Turkey, Japan, India, and Pakistan also depend on the region because of their increasing crude oil and natural gas demand. So, considering the growing demand for crude oil and natural gas of other countries, economically, this region emerges as a significant player in the world energy market.

On the other hand, the collapse of Soviet Union triggered new independent countries, especially the Caspian Sea region's countries—Azerbaijan, Kazakhstan, and Turkmenistan. Due to the rich energy resources, this region got the attention of world's biggest oil and natural gas companies and the great powers; e.g., the United States. Moreover, as a newly independent country, these countries had a weak government system and economic condition which led Russia and Iran to dominate these countries' oil and natural gas. In other words, Russia and Iran got a way to monopolize on Caspian Sea region's crude oil and natural gas resources and enhance their political influence over this region (Bayramov, 2015, para. 12). In the meantime, the USA got interested in the region because of the glut reserve of oil and natural gas. More precisely, actually, it is not just because of the access of

oil and natural gas and so-called democracy which is always asserted. The interest of USA on Caspian Sea region firstly because of its nature, as well as, preventing Russia's energy domination over the Caspian basin's oil and natural gas, and isolating Iran from the Central Asian energy market (Blank, 2008, pp. 73-76). Despite all the competitions, the Caspian region became an important player in the world energy market because of its energy pipeline politics. The major supply of Caspian region depends on pipelines; European energy markets get the supply of oil and natural gas through these pipelines where Russia and Turkey play an intermediary role. Along with Europe, Asia—China, India, and Pakistan— also mostly depends on these pipeline for receiving the crude oil and natural gas. So, considering the essence of crude oil and natural gas, politically, this region is also a significant player in the world energy politics.

In summary, from both economic and political perspectives, Caspian Sea region is one of the most important key players in the world energy economic and political area. So it is important to know the influence (economic and political) of crude oil and natural gas on the Caspian Sea region as a whole. This study analyzes the impact of crude oil and natural gas on economic growth in Caspian Sea region as a whole. I addition, it also evaluates the influence of regional politics on crude oil and natural gas in the region.

1.4. Research Questions

A research always requires proper research questions to ascertain an appropriate framework for the research. Alongside, these precise research questions bolster ensuring explicit research findings. For this reason, the study has three conspicuous research questions which are as follows:

1) What is the impact and causality of crude oil and natural gas on/with economic growth of the Caspian Sea region?
2) How regional politics influence and cause the crude oil and natural gas in the Caspian Sea region?
3) What strengths, weakness, opportunities, and threats the region has based on crude oil and gas as well as politics?

1.5. Objectives of the Study

Caspian Sea region abuts with five countries—Azerbaijan, Iran, Kazakhstan, Russia, and Turkmenistan. Due to the cornucopia of oil and natural gas, this region is becoming an important energy hub for the world energy—crude oil and natural gas—demand. On the other hand, the strategic geographical location in the world map shoves the region into the international energy politics. This strategic economic and political condition brings the Caspian Sea region on the research table. The main objectives of this study are to investigate the impact and causality of crude oil and natural gas with economic growth in Caspian Sea region. Alongside, analyzing the impact and causality of regional politics with crude oil and natural gas and investigating the internal strengths and weaknesses as well as external opportunities and Threats of the region are also one of the significant purposes of the study.

1.6. Limitations of the Study

The study analyzes crude oil and natural gas considering the economic and political situation in the Caspian Sea region. Firstly, it deals with three proxy variables—political stability, government effectiveness, and control of corruption—for defining politics which may not properly represent the politics of Caspian Sea region. Secondly, the study considers secondary data for satisfying the research questions which may lead some inclination to the findings. Importantly, the methodology of organizing the data is unlike for each organization which encapsulates different findings for the same variables. Finally, unavailability of same year data is a limitation of this study because some countries' data have yet to publish. Actually, the study considers nineteen years data from 1997 to 2015. Notwithstanding, the findings would be more satisfactory and acceptable if the study could have considered more yearly data.

1.7. Hypotheses of the Study

The study analyzes the Caspian Sea region from two perspectives: (i) economic and (ii) politics. For that reason, it assumes the hypothesis from both perspectives.

1.7.1. Economic perspective

For Ordinary Least Square (OLS) method,

Null Hypothesis (H_0): It assumes that explanatory variables for crude oil and natural gas (reserve, export, production, and price) do not have an influence on the dependent variable (GDP).

Alternative Hypothesis (H_1): It assumes that explanatory variables for crude oil and natural gas (reserve, export, production, and price) do have influence on dependent variable (GDP).

For Granger Causality test,

Null Hypothesis (H_0): GDP does not Granger cause each explanatory variable of crude oil and natural gas (reserve, export, production, and price) and vice versa.

Alternative Hypothesis (H_1): GDP Granger causes each explanatory variable of crude oil and natural gas (reserve, export, production, and price) and vice versa.

1.7.2. Political perspective

For Ordinary Least Square (OLS) method,

Null Hypothesis (H_0): It assumes that explanatory variables for politics (political stability, government effectiveness, and control of corruption) do not have an influence on the dependent variable of crude oil and natural gas (production, price, and export).

Alternative Hypothesis (H_1): It assumes that explanatory variables for politics (political stability, government effectiveness, and control of corruption) do have an influence on the dependent variable of crude oil and natural gas (production, price, and export).

For Granger Causality test,

Null Hypothesis (H_0): Crude oil and natural gas (production, price, and export) do not Granger cause each explanatory variable of politics (political stability, government effectiveness, and control of corruption) and vice versa.

Alternative Hypothesis (H_1): Crude oil and natural gas (production, price, and export) do Granger cause each explanatory variable of politics (political stability, government effectiveness, and control of corruption) and vice versa.

1.8. Definitions

Gross Domestic Product: According to the World Bank, "Gross Domestic Product (GDP) is defined as the measure of the total output of goods and services for final use occurring within the domestic territory of a given country, regardless of the allocation to domestic and foreign claims".

Crude oil: According to International Energy Agency (IEA), "Crude oil is a mineral oil consisting of a mixture of hydrocarbons of natural origin and associated impurities, such as Sulphur".

Natural gas: Natural gas, a hydrocarbon, is one of the cleanest, safest, and most useful forms of energy in our day-to-day lives. According to Energy Information Administration (EIA), "Natural gas occurs deep beneath the earth's surface. It contains mainly of methane, a compound with one carbon atom and four hydrogen atoms".

Offshore: Offshore is a land or island which is situated in an open sea and belongs to a country. In other words, it means "off the coast". Considering oil and gas, offshore refers to the establishment of oil fields and natural gas deposits under the sea.

Onshore: Onshore is out of offshore; it refers to the land. In the concentration of oil and natural gas, onshore mentions the establishment of oil fields, natural gas deposits and geothermal energy on land.

Political stability: According to the World Bank, "The index of Political Stability measures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism".

Government effectiveness: According to the World Bank, "The index of Government Effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies".

Control of corruption: According to the World Bank, "The index for Control of Corruption captures perceptions of the extent to which public power is exercised for private

gain, including both petty and grand forms of corruption, as well as capture of the state by elites and private interests".

CHAPTER TWO

2. LITERATURE REVIEW

2.1. Introduction

Energy plays a key role in our regular life where crude oil and gas are the important energy resources which influence a country as well as region's economy and politics. This study analyzes the impact and causality of crude oil and natural gas on economic growth in the Caspian Sea region. In addition, it scrutinizes the impact and causality of politics on crude oil and natural gas in the region. Alongside, it also investigates the strengths, weakness, opportunities, and threats of the region. There are numerous studies conducted on crude oil and natural gas impact on economic growth in Caspian Sea region's countries individually. But there is no such a study which explains the crude oil and natural impact on economic growth on Caspian Sea region as a whole. Likewise, the influence of politics on crude oil and natural gas in Caspian region as a whole is also absent. The paucity of the study on the Caspian Sea region as a whole obscures the importance of crude oil and natural gas of the region to the world. On the other hand, most of the studies consider only one or two variables either price or production, or both together which may not enough to analyze the impact and causality of crude oil and natural gas in the region as a whole. For that reason, this study deals with these two problems and evaluates the impact and causality of crude oil and natural gas on economic growth as well as the influence and causality of politics on crude oil and natural gas in Caspian Sea region as a whole. Besides, it also considers most important variables of crude oil and natural gas—reserve, export, production, and price rather than using just one or two variables.

2.2. Economic Aspects

The study considers four variables— reserve, export, production, and price— to illustrate each Crude oil and natural gas for analyzing economic aspect of the Caspian Sea region. On the other hand, it elects three variables—political stability, government effectiveness and control of corruption—to represent politics for analyzing political aspect in the region. A numerous study has determined that crude oil and natural gas price fluctuation influence macroeconomic variables since 1970. The increase of crude oil and natural gas price lead to raising production costs which stimulate tightening the production

level; this low production curtails the export of crude oil and natural gas that ultimately alleviates GDP growth—a fall of GDP illustrates sluggish economic growth. But, this relationship between crude oil and natural gas price is different in various studies.

Balcilar, van Eyden, Uwilingiye and Gupta (2017, pp. 12-20) studied the impact of oil price on South African GDP growth. The study ran a Bayesian Markov-switching vector autoregressive (MS-VAR) model—considering time series data from 1960Q2 to 2013Q3—to analyze the study. It found that, under the low growth regime, the oil price has a predictive content for real GDP growth. Besides, it also found that the higher growth regime to be long-lived compare to the low growth regime.

Bayraktar, Taha, and Yildiz (2016, pp. 33-43) analyzed the impact of oil prices on current account deficit and growth in the Fragile-Five countries (Brazil, Indonesia, South Africa, India, and Turkey). Here, the authors exercised panel data analysis considering thirty-four years period of data from 1980 to 2014. The results showed a significant relationship of oil prices with both GDP and current account deficit—a positive correlation between oil price and GDP and negative relationship between oil price and current account deficit. In addition, it also found that there was no long-term relationship between oil prices and GDP, but it has been found between oil prices and current account deficit. Finally, it discovered a bilateral relationship between GDP and oil price by exercising casualty test.

Behmiri and Manso (2013, pp. 78-82) investigated the impact of crude oil consumption on economic growth in Sub-Saharan Africa. The study considered twenty-three Sub-Saharan African countries and used a multivariate panel Granger causality framework during the period of 1985-2011 where crude oil price contemplated as a control variable for the model. The results showed that, on a short-run basis, there is a bilateral causality relationship between crude oil consumption and economic growth in oil importing countries, but the relation is unilateral considering oil exporting countries. However, on a long-run basis, there is a bilateral causality relationship between them considering both oil importing and exporting countries.

Benedictow, Fjærtoft, and Løfsnæs (2013, pp. 400-410) analyzed the effects of fluctuations in oil price and economic policy factors in Russia. The study used a macro-econometric model to analyze the time series data from 1995Q1 to 2008Q1. It found that

though a large variation in oil price is responsible for the vulnerability of Russian economy, its economic growth is significant when there is an absence of oil price growth.

Chang, Jha, Fernandez, and Jam'an (2011, p. 1) investigated the fluctuation of oil price and macroeconomic performances in Asian and Oceanic economics. The study delivered an inclusive cross-country comparative analysis for the region as a whole. It found a discrete oil price and GDP connection among the countries based on their economic features where exporting countries oil price has a positive impact on their GDP. In addition, considering small and open economy, there is a short-run negative impact of oil price shock on GDP whereas an obscure effect of oil on the GDP for fast-growing and large economies.

Du, Yanan, and Wei (2010, pp. 4144-4150) examined the linkage between oil price and China's macro economy. The study applied a multivariate vector autoregressive (VAR) model considering a monthly time series data from 1995 to 2008. It found that the oil price significantly affects China's economic growth and inflation, but the impact is non-linear. Contrariwise, the results also showed that China's economy does not affect the world oil price which means China has yet to have oil pricing power that can affect world oil market.

Ftiti, Guesmi, Teulon and Chouachi (2017, p. 11) examined the linkage between crude oil prices and economic growth for four OPEC member countries (United Arab Emirates, Kuwait, Saudi Arabia, and Venezuela). The study considered the frequency approach of Priestley and Tong (1973) which analyzed the data from 3 September 2000 to 3 December 2010. It found that the vacillation of crude oil prices in the global business cycle and/or financial crisis affect the relationship between oil and economic growth in OPEC member countries.

Gelb (2005, para. 1) investigated the production and prospect of the Caspian crude oil and natural gas. He concluded that there is a chance of finding an enormous amount of crude oil and natural gas reserve in the Caspian Sea region which would accelerate large production of crude oil and natural gas in that region.

Hanabusa (2009, pp. 1954-1956) scrutinized the causal relationship between oil price and economic growth in Japan from 2000 to 2008. He used an exponential generalized autoregressive conditional heteroskedasticity (EGARCH) model to analyze the data. At the

end, the study revealed that economic growth rate Granger causes the change of oil price in mean and variance; it means that the current value of the change of oil price can be predicted by using the economic growth rate considering mean and variance. On the other hand, the change of oil price Granger causes the economic growth rate which means that economic growth rate can be predicted by using the change of oil price considering mean and variance.

Idrisov, Kazakova, and Polbin (2015, p. 257) analyzed the impact of world oil price on economic growth (in terms of output) in Russia. The study argued that there is a spectacular effect of global oil prices on output under current economic situation since the 2000s. It found that considering the classical model, there is no impact of global oil prices on long-term economic growth in Russia while the price increases constantly, but the price can predetermine short-term transitional trends from one long-term equilibrium to another.

Jalil, Ghani, and Duasa (2009, pp. 250-251) studied the influence of oil prices on economic growth in Malaysia. Here, the authors considered three oil prices—world oil price (PW), world oil price in domestic currency (PWD), and domestic oil price (PD). The study applied vector autoregressive (VAR) model and asymmetric test to analyze the quarterly time series data from 1991 to 2005. It found that the changes in domestic oil price (PD) have an obvious effect on GDP and there is an asymmetric relationship between oil price changes and Malaysian economy.

Jiménez-Rodríguez and Sánchez (2005, pp. 1, 5, 8) analyzed oil price shock and real GDP growth in some OECD countries. The study used multivariate vector autoregressive (VAR) method to analyze each country; it considers both linear and non-linear approaches for modeling the role of oil prices. The results indicated that oil price has a negative impact on GDP growth considering oil importing countries. In terms of exporting countries, oil price also negatively impact on GDP growth except for UK and Norway where this relation varied.

Kiani and Pourfakhraei (2010, p. 7764) illustrated a system dynamic model of Iranian oil and gas sector for production and consumption policy. This model recorded the responses between demand and supply and oil revenue of the current system in Iran considering different sectors of the economy. In addition, it also measured the surplus of oil

export and gas injection conforming a balance between demand and supply. The study selected some major factors, considering three scenarios (worst, base, and ideal), to identify the future trends of these factors, for instance, seasonal gas consumption in power plants, economic growth in the industrial sectors, seasonal injected gas in oil reservoirs, oil consumption in the transportation sectors, and industrial gas consumption as well as export. Finally, the results showed that the export of gas will reach around 500 or 620 million cubic meters per day considering various scenarios and export revenue may touch up to 500 billion USD by 2025.

Kwok and Zhang (2006, para. 11, 26) examined how the external oil supply shocks impact the Chinese economy. The study used the data since China's economic reform where it ratified an external oil supply shocks accumulated by Kilian (2005a) as the independent variable. The results showed that a negative oil supply shock has no meaningful negative impact on China's real GDP growth as other manufacturing-based countries.

Monjazeb, Souri, and Shahabi (2013, p. 2118) studied the impact of oil price shocks on economic growth in oil-exporting countries. The study considered yearly data of 26 countries from 1990 to 2009 and it ran a panel data regression model with a fixed and random method. The findings found a reciprocal relationship between oil price shock and economic growth—positive shock has positive and negative shock has a negative effect on GDP growth in oil exporting countries.

Moroney and Berg (1999, p. 105) analyzed an integrated model of oil production. The paper illustrated a diverse way of analyzing economic variables to forecast oil production. It found that using models which analyze the reserves of oil considering economic and regulatory variables together represent a better-forecasted result than models analyze the reserves of oil production or economic and regulatory variables separately.

Parvin Hosseini and Tang (2014, p. 427) examined the effects of oil and non-oil exports on economic growth in Iran. The authors used a multivariate cointegration and Granger causality methods which considered thirty-eight years data from 1970 to 2008. They found that oil export has an inverse effect on economic growth in Iranian economy.

Peach and Starbuck (2011, pp. 7-15) analyzed the relationship between the production of oil and gas and economic growth in New Mexico. The study used cross-section data from 33 counties for finding the relationship and it considered five census years—1960, 1970, 1980, 1990 and 2000. It found that oil and gas production has a small but positive impact on economic growth, especially income, employment, and population.

Prasad, Narayan, and Narayan (2007, pp. 6507, 6509) studied the relationship between oil prices and real GDP in the Fiji Islands. They used a time series data during the period of 1970-2005. The results showed that there is a positive relationship between oil prices and real GDP in the Fiji Islands.

Raheem (2016, para. 1) investigated the role of oil and non-oil exports on the Nigerian economy. The study ran Johansen cointegration test, Granger causality test by considering a time series data from 1981 to 2015 to ascertain the finding of the study. The results showed an opposite relationship between crude oil export and economic growth while non-oil positively correlated with economic growth in Nigeria.

Reynolds and Kolodziej (2008, p. 271) studied the relationship between oil production and GDP of Former Soviet Union (FSU) during the transition period of 1987-1996. The econometrics analysis found that the decline of GDP in Soviet and former Soviet during 1980s to 1990s does not Granger cause the decline in oil production, but there is a Granger cause when the pair is opposite means the decline in oil production did Granger cause the fall of GDP.

Sachs and Warner (1995, p. 5338) analyzed natural resources abundance and economic growth. They found a negative relationship between these. Considering 1971 as a base year, the paper illustrated that economics with a high ratio of natural resource exports to GDP led a low growth rate during the period of 1971-1989.

Sarıca and Tyner (2016, p. 1) studied economic impacts of increased U.S. exports of natural gas. To analyze the study, the authors applied the MARket ALlocation (MARKAL)-Macro model and keep bottom-up model. Here, the study found that a large level export of natural gas leads to a small decline in GDP.

Tamba (2017, pp. 275, 277-281) investigated a causal relationship between crude oil production and economic growth in Cameroon. The study considered thirty-three years data

from 1977 to 2010; it used vector autoregressive (VAR) model and Wald test to analyze this relationship. Here, the author found that there is no causal relationship between the production of crude oil and economic growth in Cameroon.

Umar and Kilishi (2010, pp. 29, 41-44) analyzed the volatility of crude oil price and its impact on the Nigerian economy. The study considered four macroeconomic variables—GDP, money supply, unemployment, and CPI—to represent Nigeria's economy. It applied vector autoregressive (VAR) model and variance decomposition test, and found that crude oil price has a significant impact on GDP, money supply, and unemployment except for CPI.

Weber (2012, pp. 1580, 1583-1587) investigated the effects of a substantial upsurge of natural gas production on employment and income in Colorado, Texas, and Wyoming. The study considered the change in natural gas production during the period of 1998/99-2007/08. Here, the author found that a broad increase of natural gas production influenced moderate rise in employment, wage and salary income, and average household income.

2.3. Political Aspects

Amineh and Houweling (2007, pp. 365-388) analyzed the global energy security and it hinders considering the Caspian Sea region. Historically, large energy companies in Western countries have a tendency to control energy resources beyond the border of their countries through an invasion of the host country by their home state. After collapsing of the Soviet Union, the USA has been expanding their defense perimeter, it ran from Rumania to Central Eurasia, Israel, Afghanistan, and Pakistan. The study distinguished between the creation and transfer of property rights, structural scarcity, demand-included scarcity, and supply-included scarcity.

Alam (2002, p. 5) inspected the pipeline politics in the Caspian Sea region. The abundance of crude oil and natural gas reserves has depicted the region strategically and geopolitically more important to the world. Especially, the transportation routes for oil and gas to the world have intensified the geo-rivalry among the major important players in the region—Russia and Iran. The study identified that the recent critical situation in Afghanistan may change the overall scenario of the region, it is because of the presence of the USA and the cooperation of Russia with the USA and West for the war against the

terrorist groups. The military presence in that region would affect the influence of Russia and Iran on that region.

Bardakçi (2003, p. 1) investigated Russian interest and strategic policies on the Caspian Sea region and Turkey. The study suggested that, in the beginning of the twenty-first century, Russia has started to execute new realistic policies over the Caspian Sea region, especially after the presence of Putin, as a new leader of Russia. It also mentioned the development of diplomatic relation, cooperative approach, between Turkey and Moscow considering the Caspian Sea region despite the rivalry in the Caucasia.

Benke (2010, pp. 7-52) studied the influence of the world major four powerful countries—the USA, Russia, China, and the European Union—on the Caspian Sea region and their geopolitical competition over the region's natural gas transportation routes. The study evaluated the risks of proposing natural gas pipeline projects in the Caspian Sea region considering the vulnerability in the regional states. In addition, it analyzed the influence of Russia over the region considering natural gas reserve and transportation routes as well as it also evaluated the influence of each country's interest on the select of natural gas transportation routes to European energy market.

Ciarreta and Nasirov (2012, pp. 282, 291) inspected the trend of development of Azerbaijan's oil and gas sector. It scrutinized the impact of these sectors on the economy of Azerbaijan. Here, the study ascertained various variables which stimulate foreign investors to invest in the country's oil and gas sectors, it also recognized the government policy by finding these variables.

Hancock (2006, pp. 67-68) analyzed the possible shifting of Turkmenistan's natural gas market from Russia to China. After collapsing of Soviet Union, each newly independent countries have had the contingent whether it would reunite with Russia in an economically integrated neo-empire or it would abandon the previous imperial power. The study mentioned that Turkmenistan has been looking for an alternative route for natural gas which will alleviate the influence of Russia on the natural gas market. In April 2006, an agreement of building pipeline had been taken place between China and Turkmenistan. This agreement gave Turkmenistan's leader a hope of reducing Russian dominance over its cheap natural gas resources.

Kubicek (2013, pp. 171-180) studied energy politics and geopolitical rivalry or competition in the Caspian basin. The paper mentioned geopolitical competition based on the desire to control and exploit the energy resources, it mainly focused on the interest of three major and important countries—the USA, Russia, and China. As with the three countries, the local countries also play an important role in that region which is no more passive now, but active. The finding of the study is little bit complex considering the power balance in the region, however, China plays a major role, the best position, in the region.

Leite and Weidmann (1999, pp. 1, 30-31) investigated the relationship among an abundance of natural resources, corruption, and economic growth. The paper debated that the cornucopia of natural resources generates the convenience of rent-seeking behavior, it also argued that this glut of natural resources is an essential variable to measure the level of corruption in a country. It found that the degree of corruption depends on the glut of natural resources, government policies and the bureaucratic power.

Manning and Jaffe (1998, pp. 112-129) inspected the real geopolitics of energy considering the myth of the Caspian region's energy, so-called great game. Due to the energy cornucopia in the region, it became a major strategical and geopolitical player in the energy world. The study mentioned that though the region has a significant reserve of crude oil and natural gas, its logistic, economic and political impediments will prevent their sustainable development. On the other hand, for the calculable future, the Persian Gulf will remain more inexpensive, accessible and safe region. Here, the authors suggested policymakers to concentrate more on the Persian Gulf rather than the Caspian Sea region.

Marketos (2009, pp. 1-19) investigated the influence of the three major powerful countries—the USA, Russia, and China—on the Eastern Caspian Sea energy geopolitics. For the sustainable control and influence over natural resources, the USA is determined to continue the leading role over Eurasia energy resources where Russia and China also play a major role. Here, the study mentioned two major pipelines—the Trans-Caspian Corridor and Nabucco pipeline, or the Prikaspiisky and South Stream pipelines—from two Caspian basin countries (Turkmenistan and Kazakhstan) which connect European energy market with Eurasia. As the study concluded, controlling or influencing these two projects will determine the major geostrategic control over Eurasia. On the other hand, it may also place

a new geopolitical power or coalition of powers which would be a threat for the USA and West as a whole; for example, Russia and China coalition already enabled enough to dominate the Caspian Sea region's energy resources.

Ross (2001, pp. 325-357) investigated the relationship between oil and democracy for the assertion of "oil thwarts democracy". The study tested this statement from three aspects: First, considering other variables, does oil have a frequently antidemocratic influence on oil abundance countries? Second, does this claim only for the Middle East countries or other countries, too? As well as, whether it is only for oil or other kinds of minerals or commodity are responsible for this. Finally, if oil is responsible for impeding democracy then what is the causal mechanism? To find the findings, it used pooled time-series cross-national data and considered 113 countries between 1971 and 1997. In addition, the study also introduced three effects to analyze the statement: rentier effect, repression effect, and modernization effect. It found at least limited support for all the three effects.

Thomas and Skull (1999, pp. 75-96) analyzed Russian national interest in the Caspian Sea region. They recommended that Russia should enlighten the diplomacy and some visionary leader who can anticipate the future of the region; they can develop the policies to achieve the goal of the future.

2.4. Overview of Caspian Sea Region

The Caspian Sea is a landlocked body of water between Europe and Asia surrounded by five littoral (coastal) countries—the southwest by Azerbaijan, south by Iran, northeast by Kazakhstan, southeast by Turkmenistan and the northwest by Russia—border inland sea. Though Uzbekistan has a considerable amount of territory and energy resources with Caspian basin, it is not included in this study because the study only considers littoral (coastal) countries. The Caspian Sea region attracts international attention because of its abundance of oil and natural gas, this energy cornucopia is not just a recent phenomenon for the region. Historical record acknowledges the region as a primitive oil extraction area in the extraction history. In 1846, the world first oil well drilled in Bibi-Hybat (Azerbaijan); for that reason, Azerbaijan considers as one of the birthplace for oil industry. The Apsheron peninsula near Baku was an archaic oil extraction area which facilitated Russian Empire

especially Soviet Union. But, due to the appearance of new oil field such as West Siberia, its contribution of world supply fell in second half of Twenty century.

Before the collapse of the Soviet Union, the Caspian Sea region mainly dominated by two important empires: Russian Empire and Persian Empire which transformed into Soviet Union and Iran. Then the Caspian region allotted to three newly independent nations: Azerbaijan, Kazakhstan and Turkmenistan and the energy resources also dividend based on the territory. But Caspian basin has a legal dispute whether it is named as a sea or lake. According to the U.S. Energy Information Administration (EIA), if it considers as a sea then the littoral countries can apply the United Nations Convention on the Law of the Sea of 1982 (UNCLOS); otherwise, if it considers as a lake then they could use the international law which considers setting border for lake. Now, if the Caspian is a legal sea, under UNCLOS, each coastal country gains a territorial sea up to twelve nautical miles, an exclusive economic zone (EEZ) up to nautical 200 miles, and a continental shelf. Under this law, Azerbaijan and Turkmenistan will get an exclusionary access of offshore assets, but Iran would not able to access the assets. On the other hand, if the Caspian considers as a legal lake then international agreements of Border States regulate the use of border water. Moreover, all the laws put in aside, the government of Iran has appealed for equal distributions—each littoral country obtains 20% of the sea floor and surface of the Caspian.

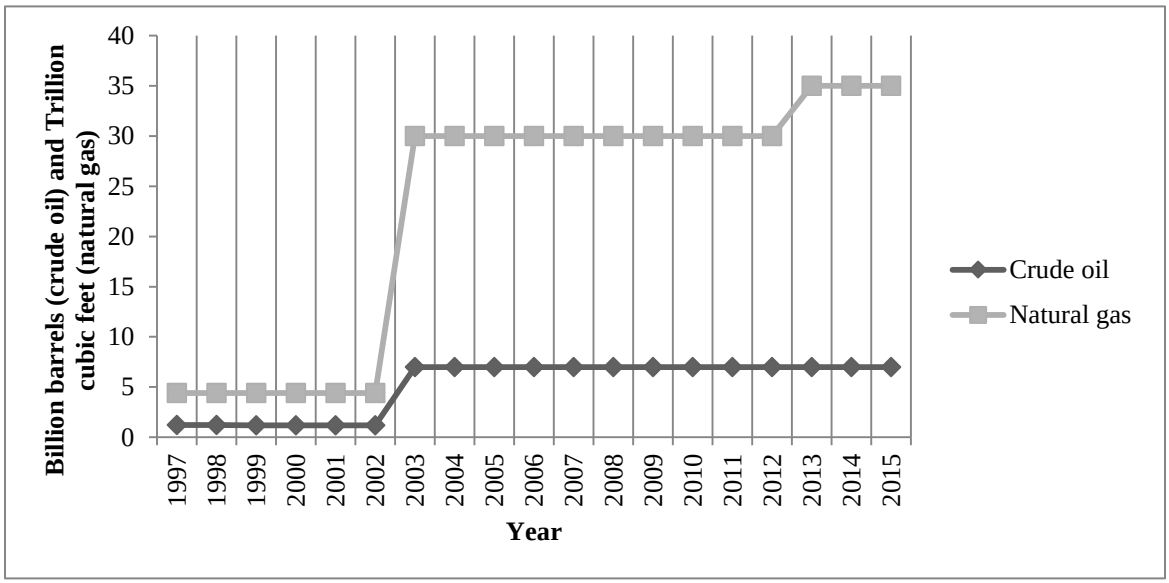
2.4.1. Economic overview of Caspian Sea region based on crude oil and natural gas

In this economic overview of Caspian Sea region, the study states five littoral countries' crude oil and natural gas as well as gross domestic product scenario from 1997 to 2015. Through this overview, the study illustrates the current economic condition of the countries along with the previous economic position. In this section, considering crude oil and natural gas, the study considers the overall economic outlook of each country which abuts Caspian Sea.

2.4.1.1. Azerbaijan

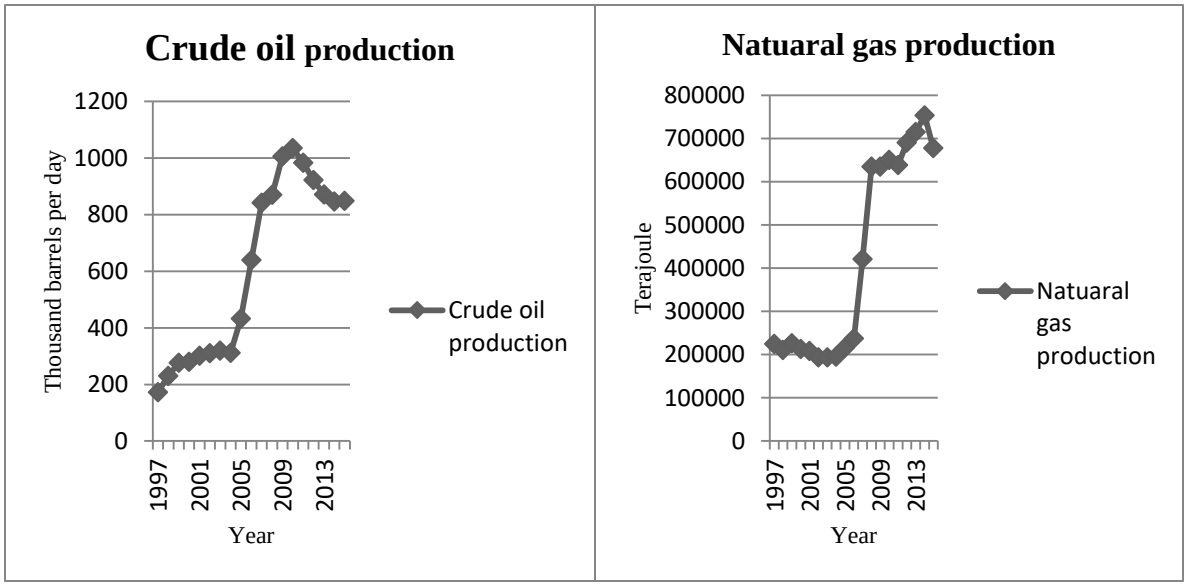
The collapse of Soviet Union generated three major independent countries in the Caspian Sea region, Azerbaijan is one of them. Though the size of the country relatively small, it possesses a significant amount of energy which has introduced Azerbaijan as a key player to the energy world. The economy of the Azerbaijan firmly depends on its energy

resources. According to International Trade Center (ITC), the energy—minerals (Petroleum oils and oils obtained from bituminous minerals)—is the prime exporting item for Azerbaijan, it covered 93.4% average share of export in 2011 to 2015 which unequivocally illustrates the country's dependency on energy. Meanwhile, the economy of Azerbaijan which is represented by gross domestic product is noticeably growing. According to World Bank, in 1997, the average GDP was approximately 3.9 billion USD which reached at highest average 75.19 billion USD in 2014. But, in 2015, it experienced a downturn which is around 53 billion USD. In the following literature, the study explains the overall scenario of crude oil and natural gas—reserve, production, and export—of Azerbaijan.



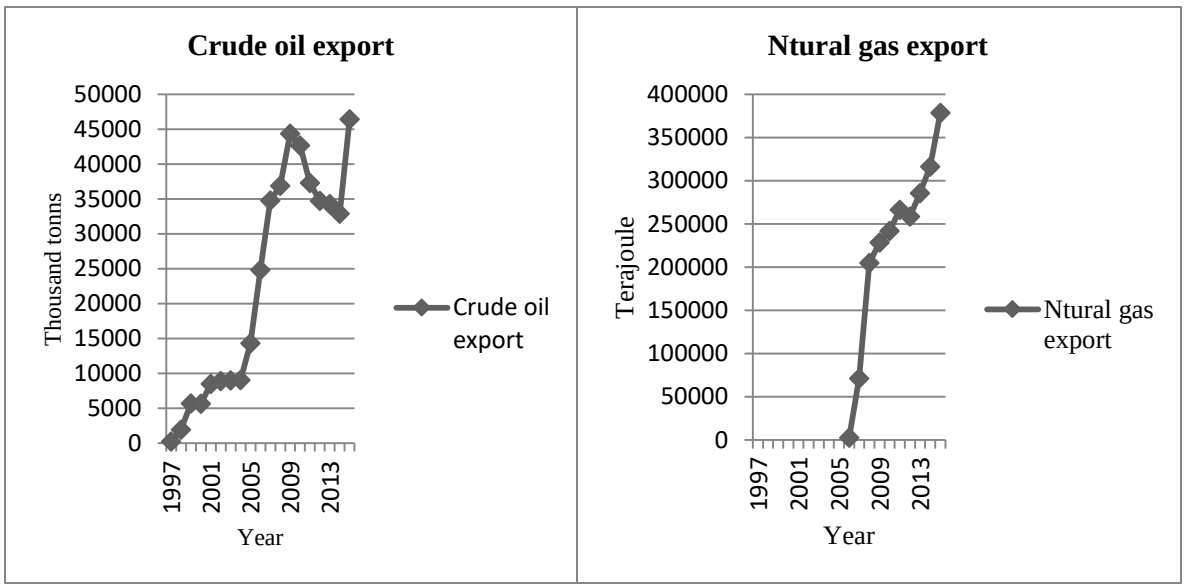
Graph 2.1. *Crude oil and Natural gas reserve of Azerbaijan from 1997 to 2015*
Source: *U.S. Energy Information Administration*

The graph 2.1 illustrates the nineteen years crude oil and natural gas proven reserve of Azerbaijan. Considering energy resources, Azerbaijan has natural gas cornucopia compare to crude oil. Until 2002, it has a minimum level of crude oil and natural gas but just after the year, it discovered a huge amount of natural gas reserve which is rocketed from around 4 trillion cubic feet to 30 trillion cubic feet. The discovery got pace again in 2013 and found the natural gas proven reserve of 35 trillion cubic feet which is five times higher than crude oil reserve. As with natural gas, crude oil reserve also increased but not like natural gas.



Graph 2.2. *Crude oil and Natural gas production in Azerbaijan from 1997 to 2015*
Source: *International Energy Agency and Index Mundi*

The graph 2.2 represents the production of crude oil and natural gas in Azerbaijan with different scale of measurement. The left side of the graph shows crude oil production in thousand barrels; besides, the right one illustrates natural gas production in terajoule scale. It is noticeable that both crude oil and natural gas's production dramatically increased in 2009 and 2010 which got further pace in natural gas but not in crude oil. It shows that Azerbaijan reduced their crude oil production just after 2010.



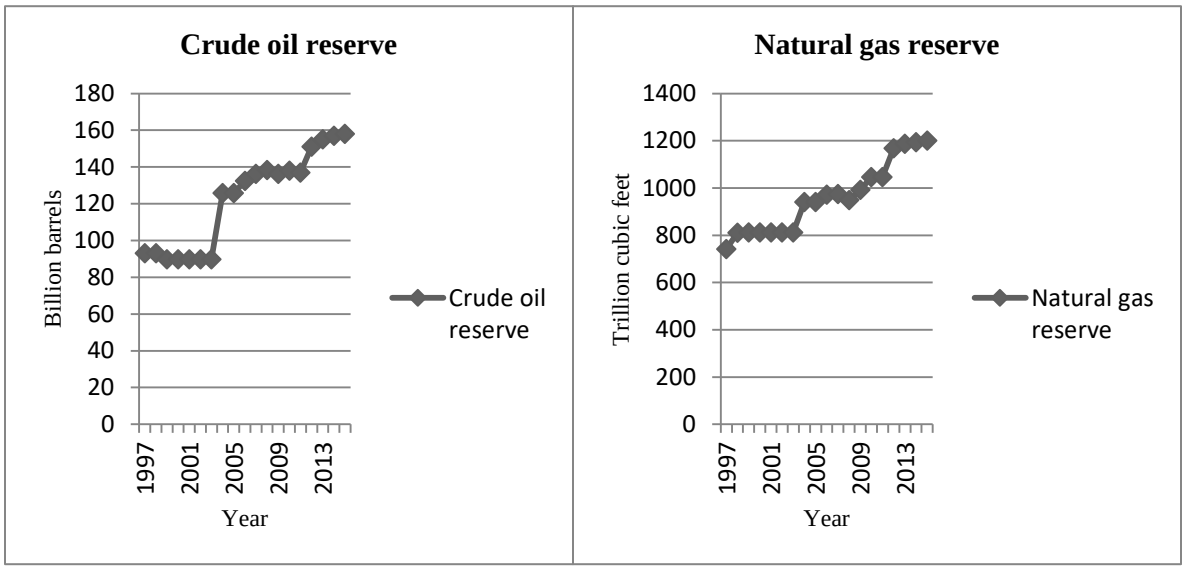
Graph 2.3. *Crude oil and Natural gas export in Azerbaijan from 1997 to 2015*
Source: *International Energy Agency and Global Energy Statistical Yearbook 2016*

The graph 2.3 illustrates export of crude oil and natural gas in Azerbaijan. The export of crude oil experienced a sluggish movement during 1997 to 2005, but in 2006, suddenly it sparked and increased dramatically until 2010 when Azerbaijan exported approximately 42,659 thousand tons. Later it faced a downturn and then got pace again after 2014. Now, considering natural gas export, it is noticeable that, Azerbaijan began exporting its natural gas in 2006 by 2536 terajoule (approximately 2.4 billion cubic feet), since then the export never goes down except experiencing a sluggish movement. In 2015, Azerbaijan exported approximately 358 billion cubic feet of natural gas.

2.4.1.2. Iran

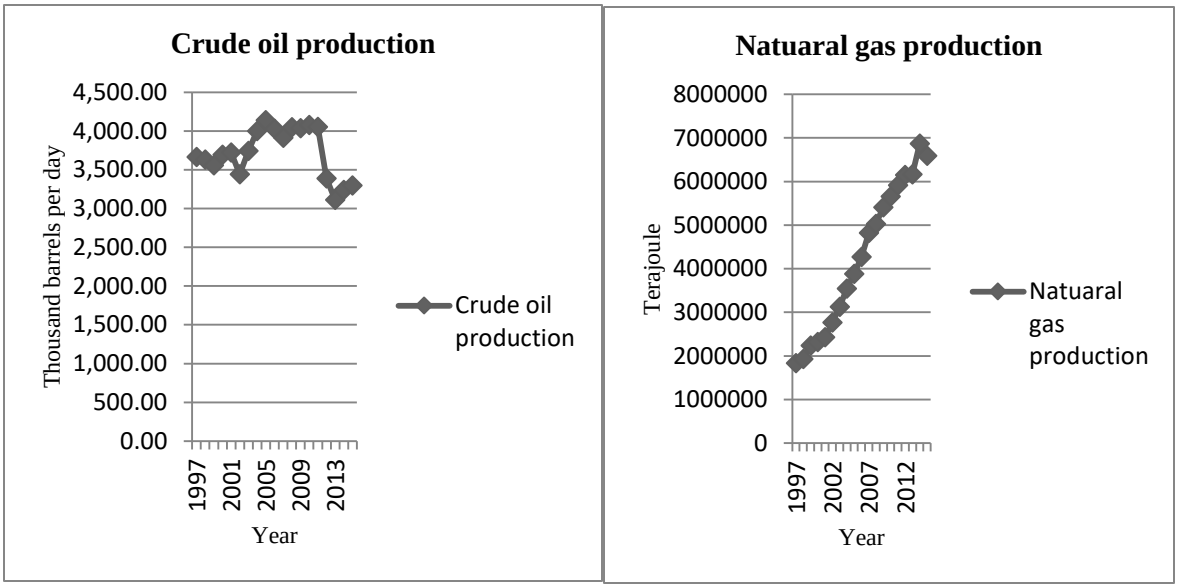
Considering natural resources, Iran is one of the richest countries in the world. The northern part of the country abuts the Caspian Sea and southern part Persian Gulf. Crude oil and natural gas are the major energy resources in Iran. According to World Bank, Iran has the second highest natural gas reserve (1201 trillion cubic feet) after Russia. Alongside, it is the number four in crude oil reserve (158 billion barrels) in the world. The International Trade Center revealed that more than half of the exports of Iran depended on minerals (Petroleum oils and oils obtained from bituminous minerals); it covered 68.7% average share of export in 2011 to 2015. Now, considering the gross domestic product, Iran is the

second largest economy in the Middle East and North Africa (MENA) region after Saudi Arabia where the GDP was approximately 393 billion USD in 2015. In the following literature, the study explains the overall scenario of crude oil and natural gas—reserve, production, and export—of Iran.



Graph 2.4. *Crude oil and Natural gas reserve of Iran from 1997 to 2015*
Source: *U.S. Energy Information Administration*

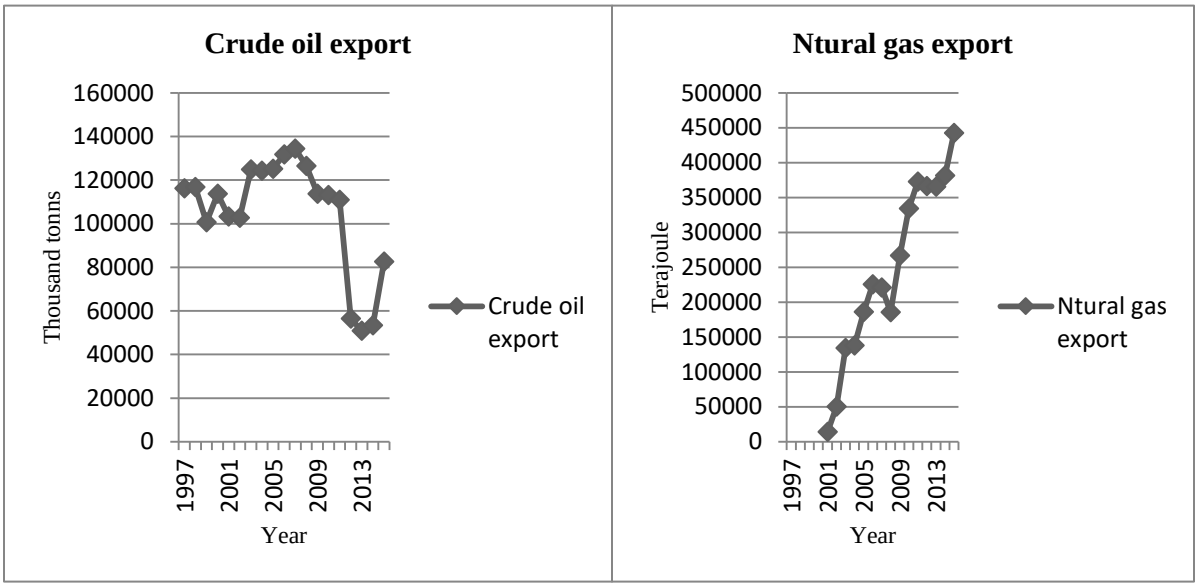
The graph 2.4 represents the amount of reserve of crude oil and natural gas in Iran. Despite the differences in measuring scale, both crude oil and natural gas reserve's line show relatively common trends over the years. The reserve of crude oil was 93 billion barrels in 1997 which suddenly increased in 2004 and culminated at 125 billion barrels. In the subsequent years, it increased significantly, and end of 2015, the reserve reached 158 billion barrels. As with crude oil, natural gas reserve also sharply increased in the same year and reached at 940 trillion cubic feet which were approximately 742 trillion cubic feet in 1997. However, in the following years, there was another significant rise of the reserve (1168 trillion cubic feet in 2012) which reached at the highest level around 1201 trillion cubic feet in 2015.



Graph 2.5. *Crude oil and Natural gas production in Iran from 1997 to 2015*
Source: *International Energy Agency and Index Mundi*

The graph 2.5 illustrates a yearly production of crude oil and natural gas in Iran from 1997 to 2015. As shown in the left side of the graph, crude oil production consequentially fluctuated during the years where the production decreased suddenly in 2002, 2007 and 2013. In 2005, Iran had the highest production of crude oil approximately 4.1 million barrels per day, but at the end of 2015, the production sharply decreased around 3.3 million barrels per day. Now, considering natural gas production, there was a substantial rise of production which began with 1.7 trillion cubic feet (1832612 terajoule) in 1997 and reached at around 6.5 trillion cubic feet (6872781 terajoule) in 2014, except the year 2015 which experienced a sharp downturn in natural gas production.

The graph-2.6 shows total export of crude oil and natural gas in Iran during 1997 to 2015. According to the nature of graph, Iran is good in exporting natural gas compare to crude oil, though both of the graphs consider different measuring scale.



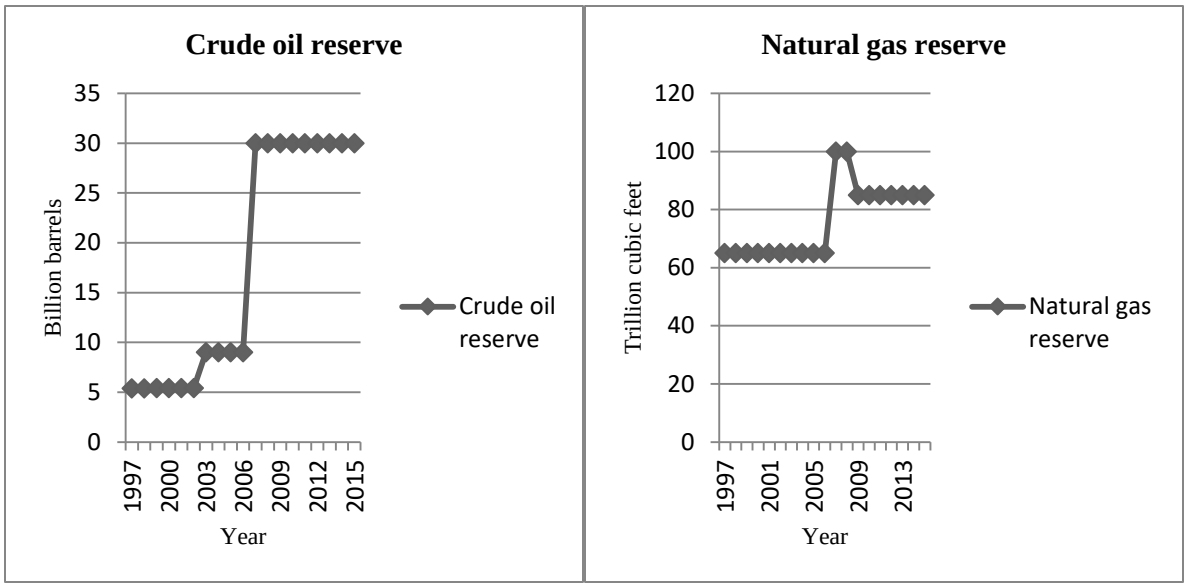
Graph 2.6. *Crude oil and Natural gas export in Iran from 1997 to 2015*
Source: *International Energy Agency and Global Energy Statistical Yearbook 2016*

Nevertheless, considering the left side of the graph, Iran experienced a normal yearly fluctuation in crude oil export until 2003, but eventually, just after the year the export had been soared and reached the highest level approximately 134 million tons in 2007. Then it experienced a downturn which ended up with a spectacular fall of crude oil export in 2012—i.e., around half of its previous year's export. On the other hand, export of natural gas experienced a substantial soar during the period which began from approximately 13.3 billion cubic feet in 2001 to 419.5 billion cubic feet in 2015. It is noticeable that before 2001 there is no available data for natural gas export in Iran.

2.4.1.3. Kazakhstan

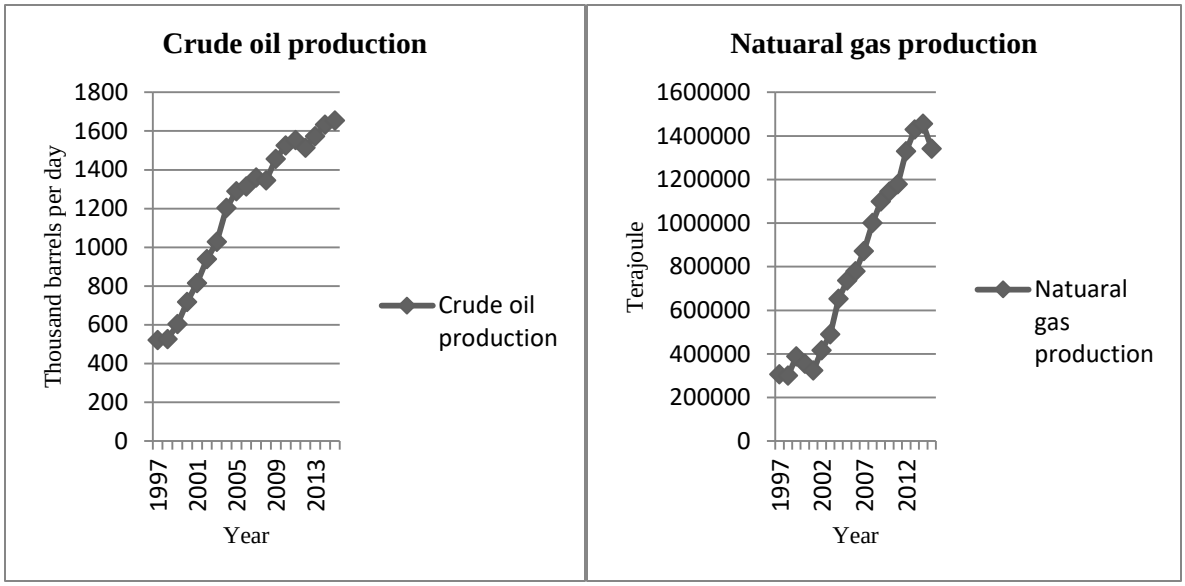
Kazakhstan, another newly independent state after collapsing the Soviet Union, has vast land area which is comparatively equal to Western Europe. However, its population density is insignificant considering its land area. Now, considering energy, like Azerbaijan, energy is the backbone of its economy. According to International Trade Center (ITC), more than two third of its exports depended on minerals (Petroleum oils and oils obtained from bituminous minerals); it covered 78.1% average share of export in 2011 to 2015.

Kazakhstan mostly depends on Russia for exporting oil to the European energy market. Due to the cornucopia of minerals and oil resources as well as the progressive economy, it has the potential for emerging one of the richest countries in Central Asia (Kazakhstan, n.d.). Now, considering GDP, according to the World Bank, Kazakhstan's gross domestic product was approximately 22 billion USD in 1997, later it reached at the highest level around 236 billion USD in 2013 which was ten times higher compared to 1997. In the following literature, the study explains the overall scenario of crude oil and natural gas—reserve, production, and export—of Kazakhstan.



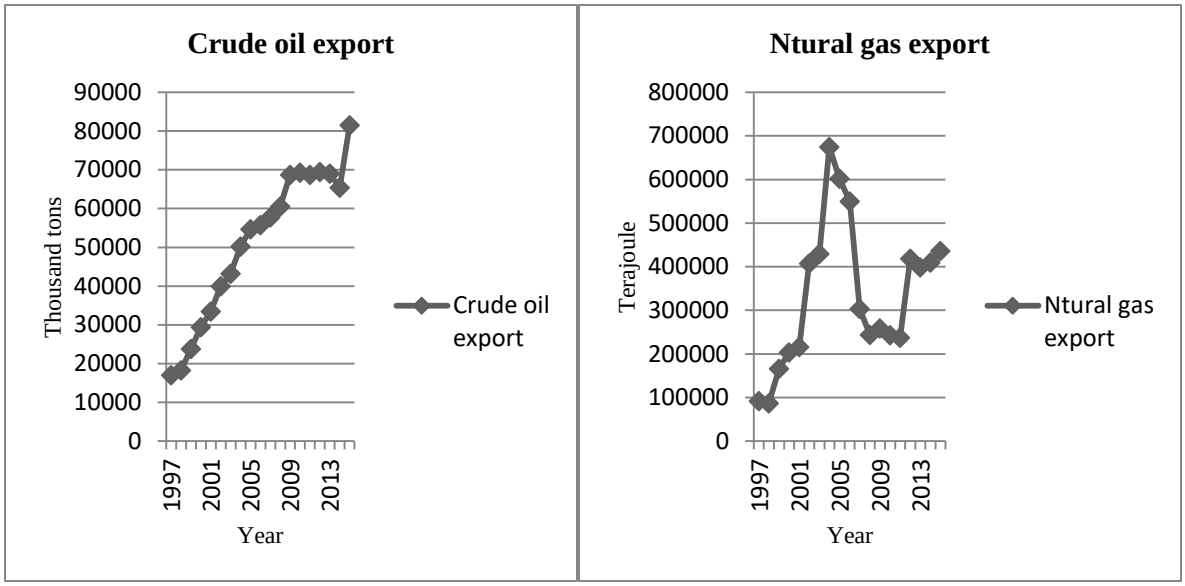
Graph 2.7. *Crude oil and Natural gas reserve of Kazakhstan from 1997 to 2015*
Source: *U.S. Energy Information Administration*

The graph 2.7 represents the reserve of crude oil and natural gas in Kazakhstan. Considering crude oil, Kazakhstan had 5.4 billion barrels reserve in 1997, later there was a sharp rise of reserve from 5.4 to 9 billion barrels in 2003. Surprisingly, this crude oil reserve dramatically increased in 2007 and reached at 30 billion barrels. As with crude oil, natural gas reserve also experienced a spectacular boost in the same year from 65 to 100 trillion cubic feet. But, suddenly, it sharply fell in the immediate year and dropped at 85 trillion cubic feet.



Graph 2.8. *Crude oil and Natural gas production in Kazakhstan from 1997 to 2015*
Source: *International Energy Agency and Index Mundi*

The graph 2.8 illustrates yearly production of crude oil and natural gas in Kazakhstan. Considering the nature of the graph, both crude oil and natural gas show upward slopes which represent rising production capacity in the sectors. During 1997 to 2015, Kazakhstan's crude oil production increased substantially which was 521 thousand barrels per day in 1997 and it reached approximately 1.6 million barrels per day in 2015. Likewise, the natural gas production also experienced a significant rise except for the late twenty century where there was a sharp fall in production. In 2014, Kazakhstan produced the highest amount of natural gas, approximately 1.3 trillion cubic feet (1454817 terajoules), but it suddenly fell again in 2015.



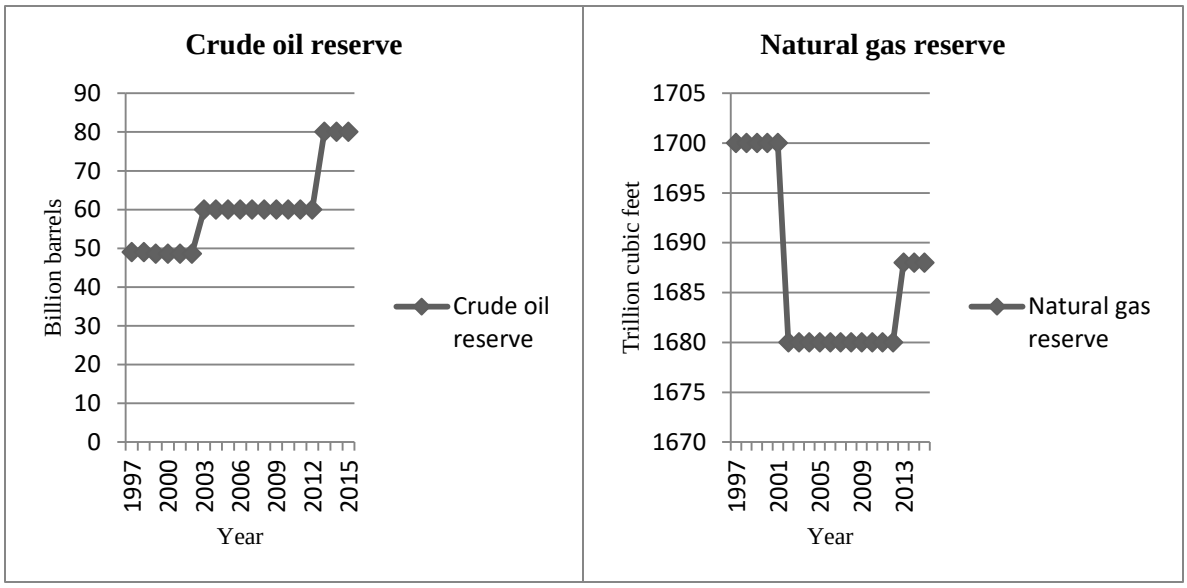
Graph 2.9. *Crude oil and Natural gas export in Kazakhstan from 1997 to 2015*
Source: *International Energy Agency and Global Energy Statistical Yearbook 2016*

The graph 2.9 demonstrates the yearly line chart of crude oil and natural gas export in Kazakhstan. Compare to natural gas export, there was a substantial increase of crude oil export in Kazakhstan from 1997 to 2013. It is noticeable that the export dropped in 2014, but subsequently there was a spectacular rise of export approximately 81 million tons in 2015. On the other hand, considering natural gas export, Kazakhstan experienced the tremendous fluctuations in the early decade of twenty-first century. In 2002, the export dramatically increased; it reached at the highest level in 2004, approximately 639 billion cubic feet. But, in the following year, the export plummeted and reached at 230 billion cubic feet in 2008. After that, there was relatively stable natural gas export next three years, but, in 2011, suddenly it sparked again and reached at approximately 396 billion cubic feet.

2.4.1.4. Russia

Russia is a country of huge energy resources and immense diversity. A significant portion of its economy depends on energy resources. According to Energy Information Administration, in 2015, the revenue of hydrocarbon, oil and natural gas represented almost half of its federal budget revenue. In the same year, Russia was the number one crude oil (including lease condensate) and second largest dry natural gas producer in the world. Considering the energy market, European energy market is one of the significant markets for Russia. In 2015, Europe imported almost 30% of crude oil and more than 30% of

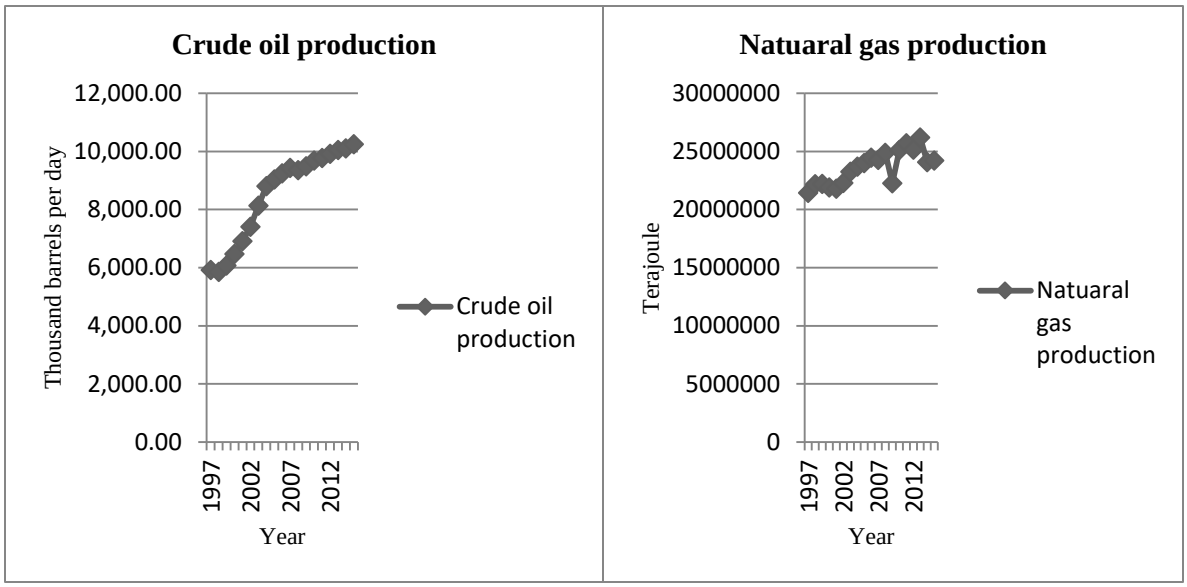
natural gas from Russia. This European imports accounted for approximately 60% of crude oil and more than 75% of natural gas in Russia's total crude oil and natural gas exports. Now, considering the whole exports, according to International Trade Center (ITC), more than two third of its exports depended on minerals (Petroleum oils and oils obtained from bituminous minerals); it covered 70.2% average share of export in 2011 to 2015. The GDP of Russia was approximately 404 billion USD in 1997 which reached around 1.3 trillion USD in 2015. Since crude oil and natural an important factor for Russian economy, in the following literature, the study elucidates the overall scenario of crude oil and natural gas—reserve, production, and export—of Russia.



Graph 2.10. *Crude oil and Natural gas reserve of Russia from 1997 to 2015*
Source: *U.S. Energy Information Administration*

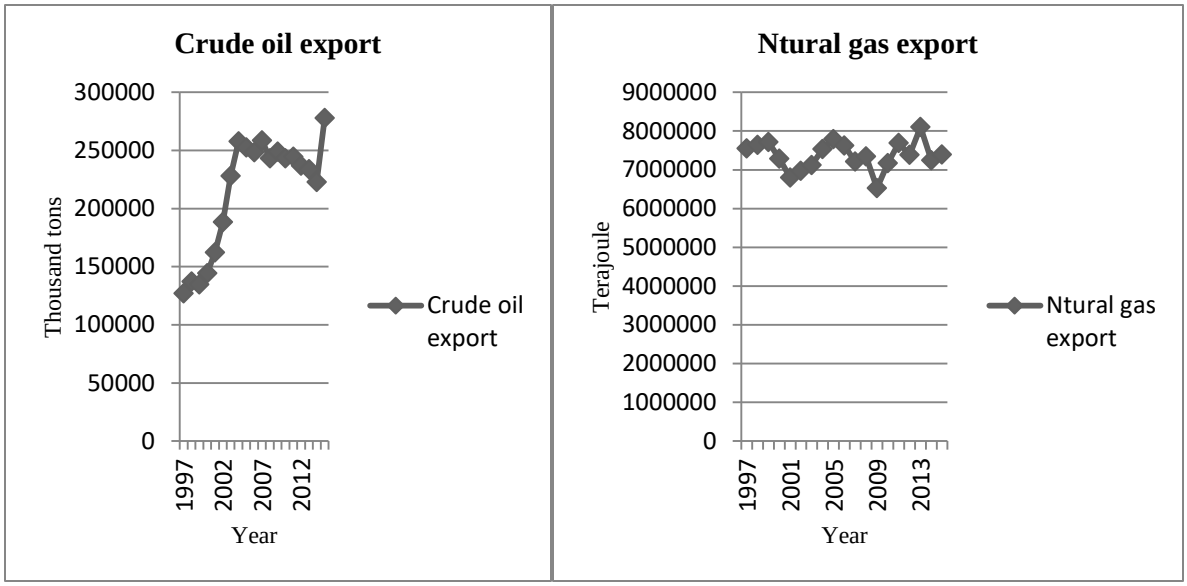
The graph 2.10 illustrates the reserve of crude oil and natural gas in Russia. In the left side, crude oil reserve shows a relatively substantial growth with some periodic sparks. Russia had around 49 billion barrels of crude oil reserve during 1997 to 2002, but suddenly it rose to 60 billion barrels in 2003. This reserve had continued until 2011 and again it sharply increased around 80 billion barrels in 2013. On the other hand, compare to crude oil, natural gas reserve experienced somehow an opposite direction during the period. In 1997, the natural gas reserve was 1700 trillion cubic feet which were identical until the beginning of the twenty-first century, but this reserve plummeted around 1600 trillion cubic feet in 2002. Later, it continued with the same amount of reserve until 2012, and then it

experienced a sudden rise of reserve around 1688 trillion cubic in 2013 which continued up to 2015.



Graph 2.11. *Crude oil and Natural gas production in Russia from 1997 to 2015*
Source: *International Energy Agency and Index Mundi*

The graph 2.11 demonstrates a yearly production of crude oil and natural gas in Russia. Considering crude oil production, Russia experienced a substantial increase during 1997 to 2015. It produced around 5.9 million barrels per day in 1997 and gradually reached the highest production of crude oil, almost double (10 million barrels per day) in 2015. On the other hand, natural gas also experienced a significant growth during the period, though there were some minor yearly fluctuations. In 1997, it produced approximately 20 trillion cubic feet of natural gas which turned to around 24 trillion cubic feet in 2008. Later, there was a sharp decline but again it increased significantly and reached the highest level of production around 25 trillion cubic feet in 2013.



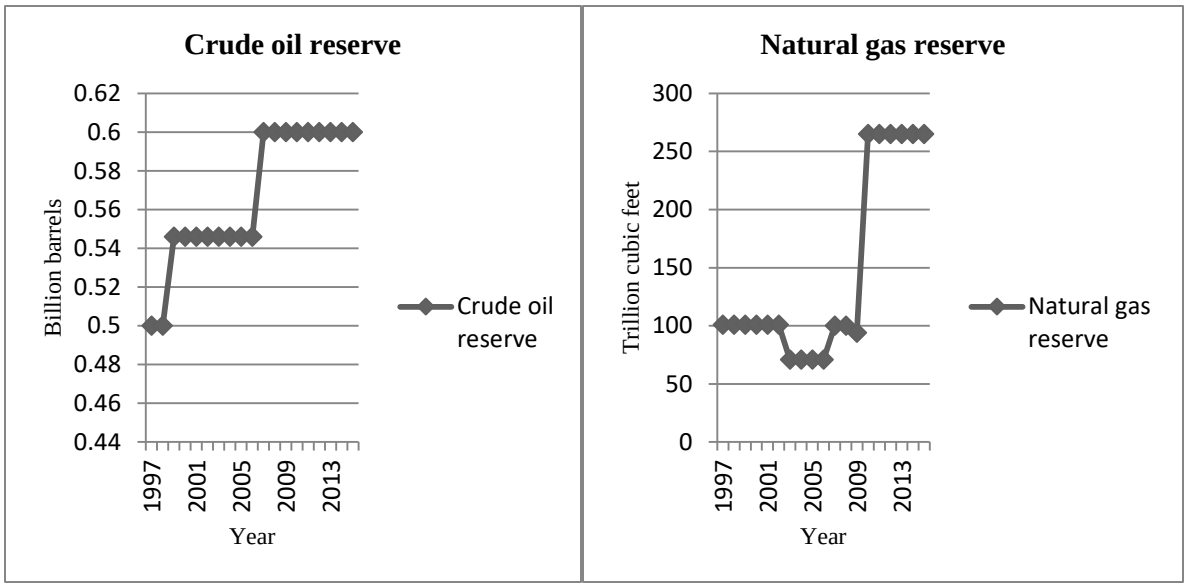
Graph 2.12. *Crude oil and Natural gas export in Russia from 1997 to 2015*
Source: *International Energy Agency and Global Energy Statistical Yearbook 2016*

The graph 2.12 represents the yearly export of cure oil and natural gas in Russia. The crude oil export, left side of the graph, possesses an *N* shape growth over the period from 1997 to 2015. Russia exported approximately 126 million tons of crude oil in 1997 which turned to 257 million tons in 2004. Later, it experienced a relatively decline period until 2014 where Russia exported around 222 million tons of crude oil. However, just after the year the export suddenly increased and reached at 277 million tons in 2015. On the other hand, natural gas export experienced a comparative oscillation over the period from 1997 to 2015. Russia exported around 7 trillion cubic feet of natural gas in 1997 which sharply declined around 6 trillion cubic feet in 2001. Later, in the subsequent years, the exports increased significantly, but again it experienced a decline in 2006. In the year 2013, Russia exported approximately 8 trillion cubic feet which is the highest volume of natural gas export over the period.

2.4.1.5. Turkmenistan

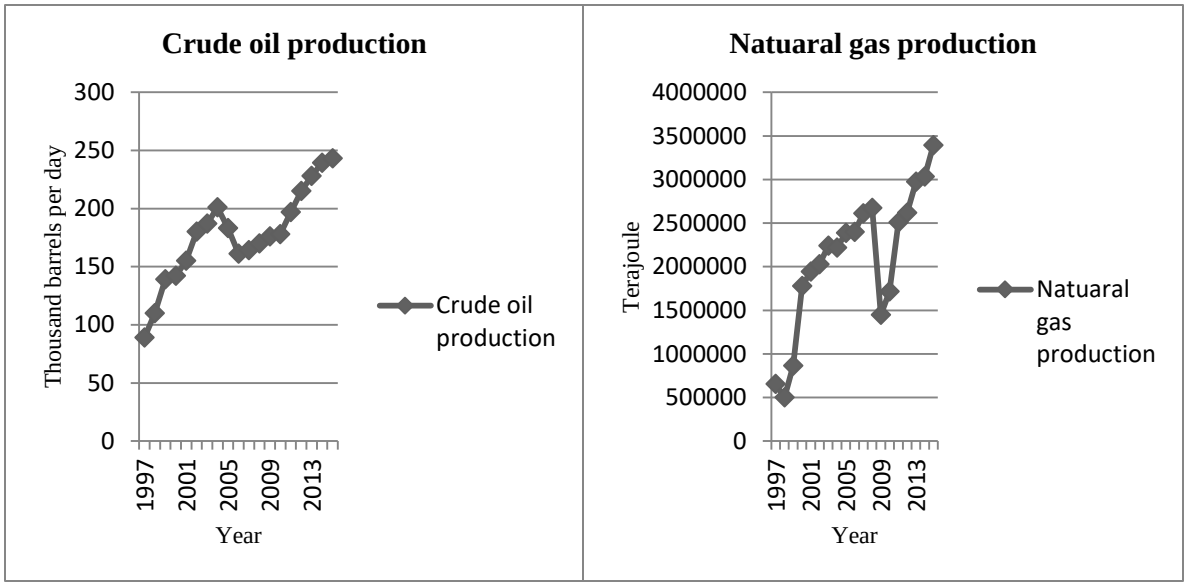
After collapsing of the Soviet Union, Turkmenistan depicted as an energy resourceful country which abuts the Caspian Sea. Energy is also an important sector for Turkmenistan. Actually, this sector is the main driven source for the country's economic growth. According to the International Trade Center, almost nine-tenths of its exports depended on minerals (Petroleum oils and oils obtained from bituminous minerals); it covered 89.7%

average share of export in 2011 to 2015. China is the largest export market for Turkmenistan's energy sector. It mainly exports natural gas to China. Now, considering GDP, in 1997, the gross domestic product was approximately 2.4 billion USD which gradually increased and reached around 36 billion USD in 2015. Since crude oil and natural an important factor for Turkmenistan's economy, in the following literature, the study explains the overall scenario of oil and natural gas—reserve, production, and export—of Turkmenistan.



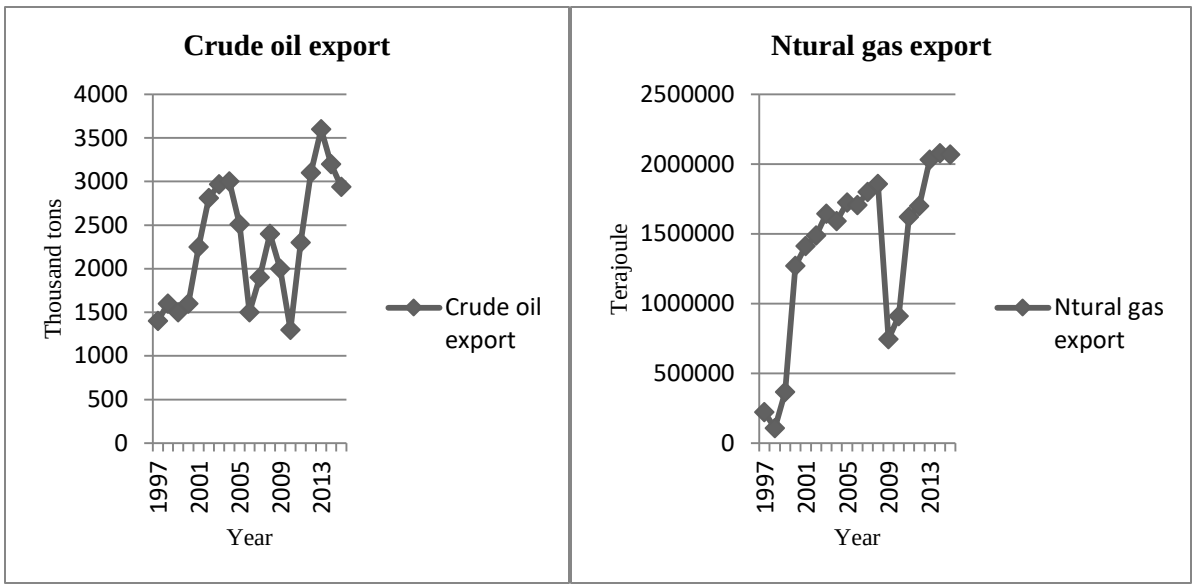
Graph 2.13. *Crude oil and Natural gas reserve of Turkmenistan from 1997 to 2015*
Source: *U.S. Energy Information Administration*

The graph 2.13 depicts the reserve of crude oil and natural gas in Turkmenistan. The left side line chart represents the crude oil's yearly reserve from 1997 to 2015 where a periodical growth of reserve has been shown. Though this growth is insignificant, there is a positive growth of crude oil reserve. On the other hand, the natural gas shows a significant level of reserve in Turkmenistan during the period. In 1997, the natural gas reserve was recorded 101 trillion cubic feet which experienced a sharp decline in 2003 (71 trillion cubic feet), but after a continuation of the level, it suddenly increased and came to the previous level (almost) in 2007 (100 trillion cubic feet). It is noticeable that the reserve of natural gas spectacularly increased in 2010 and recorded 265 trillion cubic feet which was more than double than the previous year.



Graph 2.14. *Crude oil and Natural gas production in Turkmenistan from 1997 to 2015*
Source: *International Energy Agency and Index Mundi*

The graph 2.14 represents the yearly production of crude oil and natural gas in Turkmenistan during 1997 to 2015. Considering the crude oil production, there was a substantial rise from 1997 to 2004. It began with 89 thousand barrels per day in 1997 and reached 201 thousand barrels per day in 2004. Later, it sharply declined until 2006. Then again the production increased significantly in the following years and recorded the highest volume around 243 thousand barrels per day in 2015. As with crude oil production, the natural gas production also experienced the same pattern over the period, though the measurement scale is unlike. Turkmenistan produced around 619 billion cubic feet of natural gas in 1997 which turned to approximately 2.5 trillion cubic feet in 2008. Suddenly, the production dropped around half in 2009 compared to previous year. But, in the following years, the production had been increased significantly and recorded approximately 3.2 trillion cubic feet in 2015.



Graph 2.15. *Crude oil and Natural gas export in Turkmenistan from 1997 to 2015*
Source: *International Energy Agency and Global Energy Statistical Yearbook 2016*

The graph 2.15 illustrates the export of crude oil and natural gas in Turkmenistan during 1997 to 2015. During the period, export of crude oil fluctuated comparatively in a periodic way which shows the export market volatility of crude oil in Turkmenistan. In 1997, there was a sluggish movement of crude oil export but the movement—crude oil export—suddenly sparked in 2000 and continued to increase until 2004 (3 million tons). But, in the following years, the export experienced a substantial fluctuation until 2015. In spite of this fluctuation, Turkmenistan recorded the highest export of crude oil around 3.6 million tons in 2013. On the other hand, the natural gas export experienced a significant increase from 1997 to 2008 and recorded around 1.7 trillion cubic feet in 2008. But, just after the year, the natural gas export dropped dramatically at 705 billion cubic feet. However, in the following years, there was a substantial increase of natural gas export until 2015.

2.4.2. Political overview of Caspian Sea region

The necessity of energy in our everyday life and its dearth spur the presence of politics—domestic and international—in the sector. Currently, it is quite difficult to think the energy resources by keeping the politics aside. According to Henry Kissinger, the former national security advisor of the United States, "Control oil and you control nations; control food and you control the people." This statement depicts the emergence of politics in this sector. Actually, the abundance of energy resources of countries or regions attracts others' attention towards them. The Caspian Sea is the oldest region of oil production in the world; it is an important participant in the world energy market and politics. Due to the abundance of crude oil and natural gas reserve, it pulled international attention on the region and penetrated in international politics (Yergin 2012, p. 44). In this political overview, this study explains countries' geographical position and political background based on crude oil and natural gas as well as the involvement of other countries' energy demand to the region. Here, it also explains major crude oil and natural gas pipelines in the region.

2.4.2.1. Azerbaijan

Azerbaijan is relatively a small but geographically an important country in the Caspian Sea region. Importantly, it is surrounded by three powerful countries—Russia, Iran, and Turkey. Azerbaijan follows a centralized political system where the president has the major political power on his hand. Furthermore, bypassing Russia for creating a new energy relation with West, Azerbaijan acts as a significant player on the international energy political table. It is one of the most autonomous-minded countries which has a perplex relation with Russia. As with Russia, Azerbaijan maintains a little bit complex diplomatic relation with Iran. A significant number of Azeri populations who live in Iran is one of the important reason as well as a good tie with West and Israel also a major reason behind this. On the other hand, Azerbaijan maintains a stable relationship with Kazakhstan and Turkmenistan.

2.4.2.2. Iran

Iran is one of the powerful countries in the Caspian Sea region; it is because of its energy cornucopia as well as the political role in the world politics. Its major area abuts Persian Gulf countries—Iraq and Saudi Arab. Considering Caspian region, it has a border

with Azerbaijan and Turkmenistan. Like Azerbaijan, it has a centralized political system where, according to Iran's constitution, Supreme Leader delineates and controls the general politics of the Islamic Republic of Iran and President is the second powerful official. Iran maintains a relatively good diplomatic relation with Russia which is mostly because of West. But from the regional perspective, Russia is a major competitor for Iran which is because of the probable influence on the region. As discussed before, Iran has a rigid relation with Azerbaijan, but the relation with Kazakhstan and Turkmenistan is comparatively better than others.

2.4.2.3. Kazakhstan

Kazakhstan is the second largest country by land in the Caspian Sea region after Russia. It is another FSU country which is familiar as a least densely populated country in the world. Half of the country's border abuts Russia, and rest of the border adjoins China, Uzbekistan, and Kyrgyzstan. Kazakhstan has the most privately-owned assets in the Caspian Sea region. As like Azerbaijan, Kazakhstan also follows a centralized political system; actually, it has no meaningful political opposition party. The diplomatic relation of Kazakhstan with other regional countries is relatively better than others. Kazakhstan has a strong relationship with Russia; it is the last FSU state who asserted its independence from the Soviet Union. Along with Russia, considering energy sector, Kazakhstan maintains a decent tie with Azerbaijan, Iran, and Turkmenistan.

2.4.2.4. Russia

Russia is the biggest country with a massive amount of energy resources and immense diversity in the world. It has an international border with 16 independent countries by land and two maritime borders with the USA and Japan. Now considering Caspian Sea region, it has a border with Azerbaijan and Kazakhstan. Furthermore, Russia follows a highly centralized political system which helps them to keep the vast population together. As discussed before, the diplomatic relation of Russia with other regional countries relatively complicated and competitive. Notwithstanding, Russia has comparatively a good relation with Kazakhstan compare to other countries, though China's thriving ties with Kazakhstan for energy is a major tension for Russia. This is also alike for Turkmenistan because of China's energy import is gradually increasing form the country which creates an alternative energy market for Turkmenistan. Besides, Russia's relation

with Azerbaijan is perplexed because of Azerbaijan's independent mind and a good tie with the west. On the other hand, the relation with Iran is more competitive because of its abundance of energy resources and powerful political stance in the world politics which may raise Iran's influence on the Caspian region.

2.4.2.5. Turkmenistan

Like Azerbaijan and Kazakhstan, Turkmenistan is an FSU country which debuted as an independent country after collapsing the Soviet Union in 1991. It is mostly enclosed by desert; almost 80% of the country is considered as a part of Karakum Desert. Considering Caspian region, it has a border with Kazakhstan and Iran. Turkmenistan follows an extremely centralized political system where it has a rubber–stamp[6] parliament and zero opposition parties. Furthermore, it maintains a good tie with all of the Caspian region countries, although relation with Russia slightly deteriorated when Russia cut-off its natural gas import in 2009.

2.4.3. Major Caspian crude oil and natural gas pipelines

The Caspian is a landlocked sea or lake which is surrounded by five littoral (coastal) countries —the southwest by Azerbaijan, south by Iran, northeast by Kazakhstan, southeast by Turkmenistan and the northwest by Russia. The abundance of energy resources, especially crude oil and natural gas, has brought up the region as an important actor to the world energy market. But, due to its geographical position, there is no direct sea route through which it can export the crude oil and natural gas to the world. For that reason, the emergence of pipelines is a most sophisticated way for the convenient export as well as lessening this substantial impediment.

[6] A person or organization that gives automatic approval or authorization to the decisions of others, without proper consideration.

Table 2.1. *Key pipelines route from Caspian Sea region*

Pipeline	Status	Content	Estimated capacity	Transit route (origin-destination)	Major source fields
Export to European Market					
Baku-Tbilisi-Ceyhan(BTC)	Operating	Crude oil	1,000,000 bbl/d	Kazakhstan-Azerbaijan-Georgia-Turkey	ACG, Shah Deniz, Tengiz
Caspian Pipeline Consortium (CPC)	Operating	Crude oil	684,000 bbl/d	Kazakhstan-Russia	Tengiz
Uzen-Atyrau-Samara	Operating	Crude oil	600,000 bbl/d	Kazakhstan-Russia	Tengiz
Baku-Novorossiysk (Northern Route Export Pipeline)	Operating	Crude oil	100,000 bbl/d	Azerbaijan-Russia	Sangachal
Central Asia Center gas pipeline system (CAC)	Operating	Natural Gas	eastern branch: 2,200 Bcf western branch: 120 Bcf	Turkmenistan-Uzbekistan-Kazakhstan-Russia	Dauletabad
Baku-Tbilisi-Erzurum (BTE, South Caucasus Pipeline)	Operating	Natural Gas	280 Bcf	Azerbaijan-Georgia-Turkey	Shah Deniz
Kazakhstan Caspian Transportation System (KCTS)	Proposed	Crude oil	init. 300,000 bbl/d expand to 800,000 bbl/d	Kazakhstan-Azerbaijan	Tengiz
Export to East Asian Markets					
Kazakhstan-China Pipeline	Phase 1 operating Phase 2 planned	Crude oil	currently: 240,000 bbl/d expand: 400,00 bbl/d	Kazakhstan-China	Tengiz, Zhanazhol

Turkmenistan-China Gas Pipeline	Operating	Natural Gas	1,400 Bcf	Turkmenistan-Uzbekistan-Kazakhstan-China	South Yolotan (Galkynysh),Karachaganak, Tengiz, Kashagan
Export to South Asia Markets					
Iran Oil Swap	Operating	Crude oil	200,000 bbl/d	Kazakhstan-Turkmenistan-Azerbaijan-Iran	n/a
Turkmenistan-Afghanistan-Pakistan-India Pipeline (TAPI)	Proposed	Natural Gas	1,000 Bcf	Turkmenistan-Afghanistan-Pakistan-India	South Yolotan (Galkynysh), Dauletabad

Source: *U.S. Energy Information Administration, BP, ENI, Chevron, IHS Edin, Platts, Dragon Oil.*

Table 2.1 demonstrates various pipelines by which Caspian region's countries export crude oil and natural gas to different markets in the world. Considering the number of pipelines, the region export mostly to European markets, though every pipeline does not link directly to the European markets. Some of it, firstly, goes to Russia then it links with the pipelines which carry crude oil and natural gas to the European or Western energy market. On the other hand, considering East Asia market, there are two pipelines directly go to China, where one, Kazakhstan-China Pipeline, carries crude oil and another, Turkmenistan-China Gas Pipeline, carries natural gas. In addition, there is only one proposed pipeline, Turkmenistan–Afghanistan–Pakistan–India Pipeline, which will link the Caspian region with South Asia market.

CHAPTER THREE

3. METHODOLOGY

3.1. Introduction

There are mainly two sections in this analysis: first, the impact and causality analysis of crude oil, natural gas and economic growth in Caspian Sea region—Azerbaijan, Iran, Kazakhstan, Russia, and Turkmenistan—and second, how domestic or regional politics influence crude oil and natural gas in the region. After analyzing the report from two perspectives, the study runs SWOT analysis to ascertain the strengths, weaknesses, opportunities, and threats of the region considering crude oil and natural gas as well as polities. To get a vibrant scenario of Caspian Sea region, the study investigates the region from two perspectives: economic and political.

3.2. Data Collection

The study considers secondary data sources for analyzing the Caspian Sea region. For analyzing the data, it uses time series data of nineteen years from 1997 to 2015. As mentioned before, there are two parts of the study—in the first part, economic analysis; it analyzes crude oil, natural gas and gross domestic product (GDP). The crude oil and natural gas each have been defined by four variables. Crude oil considers reserve, export, production, and price of crude oil. Likewise, natural gas also considers reserve, export, production, and price of natural gas. In this study, GDP represents the economic growth. Here, the International Energy Agency (IEA), U.S. Energy Information Administration (EIA), and Index Mundi are the main sources for collecting crude oil and natural gas time series data, and the World Bank is for the gross domestic product (GDP).

Now, in the second part, political analysis, the study analyzes crude oil, natural gas, and domestic or regional politics. Like economic analysis, the crude oil and natural gas each have been defined by four similar variables. Alongside, politics has been defined by three variables—political stability, government effectiveness, and control of corruption. The GlobalEconomy.com, a recommended online resources by the American Economic Association, is the source for these variables.

3.3. Data Calculation

The Caspian Sea is surrounded by five countries: Azerbaijan, Iran, Kazakhstan, Russia, and Turkmenistan. The time series data for each country is available, but the data for the Caspian Sea as a whole is absent which has influenced researchers to arrange the concrete data for the Caspian Sea region by accumulating five countries' data. For constructing time series data for economic analysis, the study sums the five countries' data by using Microsoft Excel Sum Function. The syntax for Microsoft Sum Function:

$SUM\ (\ number1, [number2, \ldots\ number_n])$

$SUM\ (\ Azerbaijan, [Iran, Kazakhstan, Russia, Turkmenistan])$

For constructing time series data for political analysis, the study averages the five countries' data by using Microsoft Excel Average Function. The syntax for Microsoft Average Function:

$AVERAGE\ (\ number1, [number2], \ldots\ [number_n])$

$AVERAGE\ (\ Azerbaijan, [Iran], [\text{Kazakhstan}], [\text{Russia}], [Turkmenistan])$

Here, these five countries illustrate the data for a specific year. By following these formulas, the study has ascertained nineteen years' time series data from 1997 to 2015 for the Caspian Sea region.

The absence of one-year data may affect the whole time series data; for that reason, this study has forecasted some data for crude oil, natural gas, and political variables. For crude oil and natural gas, only the export data for 2015 is absent in the source. On the other hand, for political variables—political stability, government effectiveness and corruption control—the data for 1996, 1999 and 2001 are absent. Therefore, the study considers Microsoft Excel FORECAST function for getting the data. The syntax for FORECAST function express as:

$FORECAST\ (\ x_value, known_y_values, known_x_values)$

Here, the x value predicts y value, the known y values predict y value and the known x values predict y value.

3.4. Variables Measurement and Explanation

Gross Domestic Product (GDP)**:** According to World Bank, GDP at purchaser's prices is measured by summing the gross value which is added by the whole inhabitant manufacturers in the economy. Then with the gross value, add the taxes of any product and later subtract any kind of subsidies which are not contained the value of the products. Importantly, this calculation does not deduct the depreciation of fabricated assets or depletes and degrades of natural resources. The data considers current U.S. dollars which are converted from home currencies considering single year official exchange rate. However, countries which currencies' official exchange rate do not reflect effective rate considered the actual foreign exchange transactions as well as an alternative conversion.

Crude oil: The data of crude oil, which includes four variables: reserve, production, price, and export, have been collected from International Energy Agency's (IEA) data source. Here, the study considers units (1000 tones) for crude oil.

Natural gas: Natural gas data which also includes four variables—reserve, production, price, and export—have also been collected from International Energy Agency's (IEA) data source. Here, the study considers units (*TJ: Tera joule on a gross calorific value basis*) for natural gas.

Political stability: The political stability index represents a combined measurement of various indexes—the Economist Intelligence Unit, the World Economic Forum, and the Political Risk Services and so on. The indexes consider an unsystematic transfer of government power, armed conflict, violent demonstrations, social unrest, international tensions, terrorism, as well as ethnic, religious or regional conflicts. The overall index follows a stable method so that the numbers are alike over time. The scale of the political stability index starts from positive 2.5 points (strong) to negative 2.5 points (weak).

Governance effectiveness: Like political stability index, government effectiveness index also follows the same scale which starts from positive 2.5 points (strong) to negative 2.5 points (weak).

Control of corruption: As with political stability and government effectiveness indexes, control of corruption follows the same scale which also starts from positive 2.5 points (strong) to negative 2.5 points (weak).

3.5. Data Processing Framework

The study considers time series data to ascertain the answers to the research questions. In this continuation, it demonstrates three steps to calculate the data. In the first step, section 3.6, it begins explaining unit root test to ensure whether the data is stationary or not (non-stationary). Subsequently, the study runs regression by using the most prominent method: Ordinary Least Square (OLS) in section 3.7. Finally, it concludes the calculation part by testing Granger Casualty (GC) test in section 3.8.

3.6. Test for Stationarity: Unit Root Test

For time series data, it is vital to test whether the time series is stationary or not. In other words, it can be said whether the data has a unit root or not. The use of the non-stationary time series data may lead to spurious regression (Stock and Watson, 1989, p. 3). In the spurious regression, the value of R-square could be high when two variables trending overtime even though they are not related. The result from the spurious regression may influence to take a wrong decision. On the other hand, the use of non-stationary data in a regression model may invalidate the standard assumptions for asymptotic analysis. According to Granger and Newbold (1974, para. 5), the use of non-stationary variables in a regression implies that R-square values and t-statistics no longer follow the usual distributions and they can be enthusiastically inflated.

The discrepancy of conducting non-stationary variables accelerates exercising stationary time series data. In a stationary time series data, the data's mean, variance, covariance, autocorrelation etc. are consistent over time. It is essential for econometric estimators to estimate stationarity for ascertaining standard distribution. Most of the time, time series data do not gratify the stationarity condition, and such data needs to ensure stationarity. In econometrics, economists conduct unit root test to ensure stationarity for thwarting the discrepancy of conducting non-stationary time series data. Likewise, it is also necessary to decide the order of integration of the time-series. For many decades, economist, especially macroeconomist, used to follow Gauss-Markov theorem[7] when they ran time series regression.

[7] The Gauss-Markov theorem, which is named after Carl Friedrich Gauss and Andrey Markov, states that in a linear regression model, there has zero expectation of errors; they are uncorrelated and have equal variance.

There are some varieties of powerful tests tools to ensure stationarity—such as Augmented Dickey-Fuller (ADF) test, Phillips-Perron test, GLS-detrended Dickey-Fuller test and so on. Among these tests, the study considers Augmented Dickey-Fuller (ADF) test because of its clarity and robustness in adjusting the serial correlation between the error terms.

3.6.1. Augmented Dickey-Fuller (ADF) test

In case of Dickey-Fuller (DF) test, the time series may create autocorrelation problem; for that reason, Dickey and Fuller have developed a new test is called Augmented Dickey-Fuller (ADF) test. ADF test is the most prominent unit root test tool to ensure stationarity of time series data. Considering the nature of the test, it is similar to Dickey-Fuller (DF) test, except lag difference. ADF test considers a lag difference for explained variables to regulate the autocorrelation problems. This ADF test has three shapes—(i) Only intercept, (ii) Trend and intercept, and (iii) No trend, no intercept.

$$\Delta Y_t = \beta o + \gamma Y_{t-1} + \sum_{i=1}^{p}\left(\delta_j \Delta Y_{t-i}\right) + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(i)}$$

$$\Delta Y_t = \beta o + \beta_1 T + \gamma Y_{t-1} + \sum_{i=1}^{p}(\delta_t \Delta Y_{t-i}) + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(ii)}$$

$$\Delta Y_t = \gamma Y_{t-1} + \sum_{i=1}^{k}(\alpha_i \Delta Y_{t-i}) + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(iii)}$$

In the above equations, β_0 represent intercept and T signifies a trend. Here, $Y_{t-1} = Y_{t-1} - Y_{t-2}$, $Y_{t-2} = Y_{t-2} - Y_{t-3}$ and so on. Alongside, in the equation, $\sum_{j=1}^{p}\left(\delta_j \Delta Y_{t-j}\right)$ demonstrates the lag differences and ε_t is pure white noise error term. The null hypothesis assumes that there is unit root in the time series, in other words, the time series is non-stationary. Subsequently, the alternative hypothesis denotes that there is no unit root in the time series means it is stationary. The ADF test examines γ to ascertain whether the time series is stationary or not.

$H_0: \gamma = 0$

$H_1: \gamma \neq 0$

If p-value is greater than five percent then the study is failed to reject null hypothesis means that there is a unit root in the time series data which denotes the data is non-stationary. On the other hand, if p-value is less than five percent then the study rejects null hypothesis means that the time series data is stationary.

3.7. Regression Analysis

Regression analysis is to ascertain the linear relationship between two or more variables. In other words, it is a method of predictive modeling statistical technique which inspects the relationship between dependent and independent (explanatory) variables. The regression mainly used for prediction and causal interference (Campbell & Campbell, 2008, p. 3). There are different types of regression model for analyzing the relationship among the variables—such as Linear Regression or Ordinary Least Square Regression, Logistic Regression, Polynomial Regression, Stepwise Regression, Ridge Regression, Lasso Regression (Ray, 2015). The study considers ordinary least square regression method to analyze the impact between dependent and independent variables.

3.7.1. Ordinary Least Square (OLS)

According to Pohlman, & Leitner (2003. P. 119), ordinary least square (OLS) method is a statistical technique to ascertain the relationship between a dependent and an accumulation of explanatory variables, with an error or disturbance term. The error term and linear consolidation of independent variables explain the dependent variable. The important feature of OLS, it minimizes the sum of squared disturbance or error for all variables when calculates parameter values (Campbell & Campbell, 2008, p. 6).

$$Y = \alpha_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \cdots + \beta_n X_n + \varepsilon \quad \text{(iv)}$$

Where

Y is an observed random variable, it is also called dependent or response variables. Subsequently, X is called observed non-random variables (also named conditioning or predictor or explanatory or independent variable). Alongside, α is a slope parameter—explains the status of an observed random variable in the absence of explanatory variables. On the other hand, β represents intercept parameter; it explains the magnitude and direction

of a linear relation. Finally, ε denotes unobserved random variable or error or disturbance term. It captures the amount of variation which is unpredicted by slope and intercepts parameters.

The study analyzes the Caspian Sea region based on two perspectives— (i) Economic and (ii) Political. In economic analysis, OLS regression method considers GDP as a dependent or predict variable and crude oil and natural gas—reserve, export, production, and price—as independent or explanatory variables. On the other hand, in political analysis, the method considers crude oil and natural gas—price, production, and export—as a dependent variable (individually) and political indicators—political stability, government effectiveness, and control of corruption—as independent variables. The OLS methods are as follows:

For economic analysis,

$$GDP = \alpha_0 + \beta_1(COR) + \beta_2(COPRO) + \beta_3(COEX) + \beta_4(COP) + \varepsilon \ldots\ldots\ldots\ldots \text{(v)}$$

$$GDP = \alpha_0 + \beta_1(NGR) + \beta_2(NGPRO) + \beta_3(NGEX) + \beta_4(NGP) + \varepsilon \ldots\ldots\ldots\ldots \text{(vi)}$$

Where,

COR= Crude oil reserve, COPRO= Crude oil production, COEX= Crude oil export, COP= Crude oil price, NGR= Natural gas reserve, NGPRO= Natural gas production, NGEX= Natural gas export, and NGP= Natural gas price. Alongside, β_1, β_2, β_3 and β_4 represent the sensitivity of GDP growth rate to crude oil and natural gas—reserve, production, export, and price respectively. In the linear regression, the null hypothesis assumes that explanatory variables for crude oil and natural gas do not have an impact on the dependent variable. On the other hand, alternative hypothesis assumes an opposite relation— explanatory variables for crude oil and natural gas do have an impact on the dependent variable. The hypothesis expressed as follows:

H_0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$

H_1: $\beta_1 = \beta_2 = \beta_3 = \beta_4 \neq 0$

If p-value is greater than five percent then the study is failed to reject null hypothesis means that there is no impact of explanatory variables on the dependent variable. On the other hand, if p-value is less than five percent then the study rejects null hypothesis means that the explanatory variables do have an impact on the dependent variable.

For political analysis,

$$COPRO = \alpha_0 + \beta_1(PS) + \beta_2(GE) + \beta_3(CC) + \varepsilon \ldots\ldots\ldots \text{(vii)}$$

$$NGPRO = \alpha_0 + \beta_1(PS) + \beta_2(GE) + \beta_3(CC) + \varepsilon \ldots\ldots\ldots \text{(viii)}$$

$$COP = \alpha_0 + \beta_1(PS) + \beta_2(GE) + \beta_3(CC) + \varepsilon \ldots\ldots\ldots\ldots \text{(ix)}$$

$$NGP = \alpha_0 + \beta_1(PS) + \beta_2(GE) + \beta_3(CC) + \varepsilon \ldots\ldots\ldots\ldots \text{(x)}$$

$$COEX = \alpha_0 + \beta_1(PS) + \beta_2(GE) + \beta_3(CC) + \varepsilon \ldots\ldots\ldots\ldots \text{(xi)}$$

$$NGEX = \alpha_0 + \beta_1(PS) + \beta_2(GE) + \beta_3(CC) + \varepsilon \ldots\ldots\ldots\ldots \text{(xii)}$$

Where,

COPRO= Crude oil production, COP= Crude oil price, COEX= Crude oil export, NGPRO= Natural gas production, NGP= Natural gas price, NGEX= Natural gas export, PS= Political stability, GE= Government effectiveness, and CC= control of corruption. Alongside, β_1, β_2, and β_3 represent the sensitivity of crude oil and natural gas production to political stability, government effectiveness, and control of corruption respectively.

In the linear regression, the null hypothesis assumes that explanatory variables for politics do not have impact on dependent variables. On the other hand, alternative hypothesis assumes an opposite relation— explanatory variables for politics do have impact on dependent variables. The hypothesis is expressed as follows:

H_0: $\beta_1 = \beta_2 = \beta_3 = 0$

H_1: $\beta_1 = \beta_2 = \beta_3 \neq 0$

If p-value is greater than five percent then the study is failed to reject null hypothesis means that there is no impact of explanatory variables on the dependent variables. On the other hand, if p-value is less than five percent then the study rejects null hypothesis means that the explanatory variables do have an impact on the dependent variables.

3.8. Granger causality Test

Granger causality was first proposed by Professor Clive W.J. Granger in 1965 which tests the direction of causation for time series data. It denotes causation of two variables where one variable is cause for another variable and vice-versa. In a more precise way, granger causality inspects whether a variable Y can help to forecast another variable X, if it can then we can say Y Granger causes X; otherwise, Y does not Granger cause X (Du, Yanan & Wei, 2010, p. 4145). This granger causality can provide four possibilities of outcomes. The first possibility emerges a unidirectional outcome where Y causes X. Subsequently, in the second possibility shows unidirectional outcome where X causes Y. A bidirectional causality between X and Y can emerge in the third possible outcome. The last possibility is the lack of causality between X and Y (Awe, 2012, p. 7). If the test shows X Granger causes Y then it explains that the current values of Y_t can be predicted by using past values of X_t variables.

The study performs the Granger causality test to ascertain the causal relationships between the variables. Through this test, in the first part—for economic analysis, the study tests the causal relationship between GDP and each explanatory variables for crude oil—reserve, export, production, and price. Subsequently, it also examines the causality between GDP and each explanatory variable for natural gas—reserve, export, production, and price. In the second part, for the political analysis, the study tests causality between crude oil—price, production, and export—and each explanatory variable of political indicators—political stability, government, and control of corruption. Likewise, it also tests causal relation between natural gas—price, production, and export—and each explanatory variable of political variables. The general formula of Granger causality is expressed as follows:

$$X_t = \alpha_1 X_{t-i} + \beta_1 Y_{t-i} + \acute{\varepsilon}_t \quad \text{..... (xiii)}$$

$$Y_t = \alpha_2 Y_{t-i} + \beta_2 X_{t-i} + \mu_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(xiv)}$$

In the equation,

$\acute{\varepsilon}_t$ and μ_t are a serially correlated random vector which has zero mean and finite covariance matrix. Here, α_1 and α_2 are the coefficients of X and Y respectively. Alongside, β_1 and β_1 are the coefficients of the Y and X respectively. The (X,Y) is a pair for granger causality test. Lastly, (t-i) is the lag period means that number of years of lag for the X and Y variable. For granger causality test, the study considers twenty-six pairs of variables. The pairs are divided into two parts: (i) economic (ii) political.

For economic analysis: (GDP, Crude oil reserve), (GDP, Crude oil export), (GDP, Crude oil production), (GDP, Crude oil price), (GDP, Natural gas reserve), (GDP, Natural gas export), (GDP, Natural gas production), and (GDP, Natural gas price)

For political analysis: (Crude oil production, Political Stability), (Crude oil production, Government Effectiveness), (Crude oil production, Control of Corruption), (Natural gas production, Political Stability), (Natural gas production, Government effectiveness), (Natural gas production, Corruption control), (Crude oil price, Political Stability), (Crude oil price, Government Effectiveness), (Crude oil price, Control of Corruption), (Natural gas price, Political Stability), (Natural gas price, Government Effectiveness), (Natural gas price, Control of Corruption), (Crude oil export, Political Stability), (Crude oil export, Government Effectiveness), (Crude oil export, Control of Corruption), (Natural gas export, Political Stability), (Natural gas export, Government Effectiveness), and (Natural gas export, Control of Corruption).

Now, considering hypothesis, the null hypothesis is—X does not Granger cause Y and vice versa. On the other hand, the alternative hypothesis is—X Granger causes Y and vice versa. The hypothesis is expressed as:

H_0: $\beta_1 = \beta_2 = 0$

H_1: $\beta_1 = \beta_2 \neq 0$

If the value of p is greater than five percent then the study is failed to reject the null hypothesis. It means that X does not Granger cause Y and vice versa. On the other hand, if the p-value is less than five percent then the study rejects null hypothesis which denotes that X Granger causes Y and vice versa.

3.9. Analysis Tools

The study uses a statistical package to analyze the data. Here, the only statistical tool the study considers is Eviews[8] 9.5 student version. Alongside, it also considers Microsoft Excel 2013 to calculate Sum, Average and Forecast functions. These are the two analysis tools that the study uses for analyzing the Caspian Sea region.

[8] A statistical tool or package for Windows which is used in econometrics—especially time series related analysis.

CHAPTER FOUR

4. FINDINGS AND ANALYSIS

4.1. Introduction

In this chapter, the study illustrates the empirical results after running the tests, and analyzes the results. In the first part, it analyzes the stationarity level of the time series data through ADF test. Secondly, the study discusses about regression analysis—the impact of crude oil and natural gas on economic growth as well as the impact of politics on crude oil and natural gas in the Caspian Sea region. The third part of the chapter analyzes the pairs of the variables (economic and political) through Granger causality test from both economic and politics perspective. Finally, the study scrutinizes the strengths, weaknesses, opportunities, and threats of the Caspian Sea region through SWOT analysis.

4.2. Unit Root Test Results for Stationarity

According to Granger and Newbold (1974), the use of non-stationary variables in a regression implies that R-square values and t-statistics no longer follow the usual distributions and they can be enthusiastically inflated. The discrepancy of conducting non-stationary variables accelerates exercising stationary time series data. In a stationary time series data, the data's mean, variance, covariance, autocorrelation etc. are consistent over time. It is essential for econometric estimators to estimate stationarity for ascertaining standard distribution. Most of the time, time series data does not gratify the stationarity condition, and such data needs to ensure stationarity. In econometrics, economists conduct unit root test to ensure stationarity for thwarting the discrepancy of conducting non-stationary time series data. Likewise, it is also necessary to decide the order of integration of the time-series.

The study tasted the time series data by using Augmented Dickey-Fuller (ADF) to ascertain the stationarity of the data. It has found stationarity of all variables, which is considered in the study, at first difference and considering three lags length except one variable, crude oil production, which is stationary at first difference but it considered six lag length.

Table 4.1. *Augmented Dickey-Fuller (ADF) test results*

Variables	t-ADF statistic	Critical 1%	Critical 5%	Critical 10%	Conclusion
GDP	-2.065634*	-2.708094	-1.962813	-1.606129	Stationary I(1)
COR	-3.567248*	-3.920350	-3.065585	-2.673459	Stationary I(1)
COPRO	-2.965859**	-2.792154	-1.977738	-1.602074	Stationary I(1)
COP	-3.245009*	-3.886751	-3.052169	-2.666593	Stationary I(1)
COEX	-1.976553*	-2.708094	-1.962813	-1.606129	Stationary I(1)
NGR	-4.768303**	-3.886751	-3.052169	-2.666593	Stationary I(1)
NGPRO	-3.965802**	-3.886751	-3.052169	-2.666593	Stationary I(1)
NGP	-5.384605**	-3.886751	-3.052169	-2.666593	Stationary I(1)
NGEX	-4.875451**	-3.886751	-3.052169	-2.666593	Stationary I(1)
CC	-3.447372*	-3.886751	-3.052169	-2.666593	Stationary I(1)
PS	-5.370539**	-3.886751	-3.052169	-2.666593	Stationary I(1)
GE	-3.508183**	-2.708094	-1.962813	-1.606129	Stationary I(1)

Source: *Eviews (Authors' computation)*

*Note: **indicating stationarity at 1% level of significance, *stationarity at 5% level of significance*

The results of unit root test (Augmented Dickey-Fuller) of the economic and political variables are shown in the table 4.1. The table shows ADF test statistics, critical values at different percentage, and the level of stationarity. The null hypothesis of this test is non-stationary, for that reason, the notion of this test is to reject the null hypothesis. Actually, the null hypothesis is rejected when the *p*-value is equal or less than 0.05 (5% level of significance). Another way of rejecting the null hypothesis is the *t*-value. In this case, the null hypothesis is rejected when *t*-value is greater than critical values. It is important to say that the test considers only absolute value (no negative sign). Therefore, the results are explained below.

4.2.1. Discussion

Gross Domestic Product (GDP) Time-Series: The time series of GDP is stationary at the first difference in ADF test. The test rejects the null hypothesis because the *p*-value is 0.0405 which is less than five percent. On the other hand, it has also been rejected because the *t*-value of GDP is greater than critical value at five percent level.

Crude oil reserve Time-Series: The time series has no unit root considering the first difference in the ADF test. Here, the p-value is 0.0196 which is less than five percent; t-value which is greater than critical value at five percent level. Therefore, the test rejects the null hypothesis.

Crude oil production Time-Series: The *p*-value of the ADF test of crude oil production time series is 0.0070 which is less than five percent. Therefore, the test concludes that there is no unit root—considering first difference—in the series means null hypothesis is rejected. On the other hand, *t*-value is greater than the critical value at one percent which also supports the rejection.

Crude oil price Time-Series: Crude oil price time series has no unit root in the ADF test when it considers the first difference. The test rejects null hypothesis because of p-value (0.0348) which is less than five percent. It is also verified by t-value which is greater than the critical value at five percent level.

Crude oil export Time-Series: The series is stationary at the first difference in the Augmented Dickey-Fuller test. Due to the p-value (0.0486) which is less than five percent and t-value which is greater than critical value at five percent level, the test rejects null hypothesis.

Natural gas reserve Time-Series: Augmented Dickey-Fuller test does not find any unit root in natural gas reserve time series when it considers the first difference. The test finds p-value (0.0018) which is less than five percent and t-value which is greater than critical value at one percent level. Therefore, it rejects the null hypothesis.

Natural gas production Time-Series: The series is stationary at the first difference in the Augmented Dickey-Fuller test. The test rejects null hypothesis because of p-value (0.0086) which is less than five percent and t-value which is greater than critical value at one percent level.

Natural gas price Time-Series: In the raw natural gas price time series data, it has unit root in ADF test, but when it considers first difference, there is no unit root in the series. It means that the test rejects the null hypothesis. This rejection takes place because of the p-value (0.0005) which is less than five percent, and t-value than is greater that critical value at one percent level.

Natural gas export Time-Series: The time series is stationary at the first difference in the ADF test. The test finds p-value (0.0014) which is less than five percent and t-value which is greater than the critical value at one percent level. Therefore, it rejects null hypothesis.

Control of corruption Time-Series: ADF test does not find any unit root in the control of corruption time-series data when it considers first difference. The test rejects null hypothesis due to the value of p and t. Here, p-value is 0.0236 which is less than five percent and t-value which is greater than critical value at five percent level which are the reasons for rejecting the null hypothesis.

Political stability Time-Series: The series is stationary at the first difference in the Augmented Dickey-Fuller test. Due to the p-value (0.0005) which is less than five percent and t-value which is greater than critical value at one percent level, the test rejects the null hypothesis.

Government effectiveness Time-Series: The *p*-value of the ADF test of crude oil production time series is 0.0016 which is less than five percent. Therefore, the test concludes that there is no unit root—considering first difference—in the series which denotes that the null hypothesis is rejected. On the other hand, *t*-value is greater than the critical value at one percent which also supports the rejection.

4.3. Regression Analysis

According to Pohlman, & Leitner (2003), ordinary least square (OLS) method is a statistical technique to ascertain the relationship between a dependent and independent or a collection of independent (explanatory) variables, with an error or disturbance term. The error term and linear consolidation of independent variables explains the dependent variable. The important feature of OLS is: it minimizes the sum of squared disturbance or error for all variables when calculates parameter values (Campbell & Campbell, 2008).

The study conducted the ordinary least square method from both economic and political perspective considering crude oil and natural gas. It has found various results for the economic and political perspective which are shown in the tables below:

4.3.1. Economic perspectives

Table 4.2. *Regression analysis of GDP and crude oil variables*

Dependent Variable: GDP
Method: Least Squares
Sample (adjusted): 1998 2015
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.60E+10	4.32E+10	1.064925	0.3063
COR	3.85E+09	2.87E+09	1.338145	0.2038
COPRO	-92240264	1.12E+08	-0.824405	0.4246
COP	1.86E+10	2.31E+09	8.062539	0.0000
COEX	423908.5	1376989.	0.307852	0.7631

R-squared	0.893604	Mean dependent var	8.06E+1
Adjusted R-squared	0.860867	S.D. dependent var	3.56E+1
S.E. of regression	1.33E+11	Akaike info criterion	54.29397
Sum squared resid	2.30E+23	Schwarz criterion	54.54130
Log likelihood	-483.6457	Hannan-Quinn criter.	54.32808
F-statistic	27.29624	Durbin-Watson stat	1.458168
Prob(F-statistic)	0.000003		

Source: *Eviews (authors' computation)*

Table 4.2 illustrates different measurements for interpreting regression model of GDP and crude oil variables. Here, the coefficient of crude oil reserve 3850000000 indicates that one unit increase in crude oil reserve leads to increase in GDP by 3850000000 units holding other variables fixed, but this interpretation is statistically insignificant because of p-value which is more than five percent. This same interpretation goes for other independent variables considering GDP which are also statistically insignificant except crude oil price. The crude oil price is significant; one unit increase in crude oil price leads to increase in GDP by 18600000000 units holding everything else fixed. Now, considering probability value of F-statistics, it rejects null hypothesis which means that independent variables jointly impact dependent variable, GDP, because the *p-value* of corresponding F-statistic is less than five percent. Finally, to measure how strong the data are to the fitted regression line, the R-square value 89.36% means that 89.36% variation in GDP can be explained by the independent variables—crude oil reserve, production, price, and export.

Table 4.3. *Regression analysis of GDP and natural gas variables*

Dependent Variable: GDP
Method: Least Squares
Sample (adjusted): 1998 2015
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.00E+09	5.94E+10	0.151532	0.8819
NGR	-9.10E+08	9.56E+08	-0.952607	0.3582
NGPRO	255242.5	56828.79	4.491430	0.0006
NGP	-2.72E+10	4.06E+10	-0.668511	0.5155
NGEX	-131583.6	107041.2	-1.229280	0.2408

R-squared	0.721312	Mean dependent var	8.06E+10
Adjusted R-squared	0.635562	S.D. dependent var	3.56E+11
S.E. of regression	2.15E+11	Akaike info criterion	55.25690
Sum squared resid	6.02E+23	Schwarz criterion	55.50422
Log likelihood	-492.3121	Hannan-Quinn criter.	55.29100
F-statistic	8.411799	Durbin-Watson stat	1.414115
Prob(F-statistic)	0.001407		

Source: *Eviews (authors' computation)*

The column of coefficient shows the value of each independent variables in table 4.3 where, among four, three variables have a negative sign—Natural gas reserve, price, and export. Here, the coefficient value of natural gas reserve is -910000000 which indicates one unit increase in natural gas reserve leads to decrease in GDP by 910000000 units holding everything else fixed. The same interpretation goes for other variables which have negative sign. However, natural gas production has a different interpretation, the coefficient value of the variable explains that one unit increase in natural gas production leads to increase in GDP by 255242 units holding everything else fixed. It is important to say that only natural gas production is statistically significant where rest of others are insignificant. Now, considering F-statistics, all independent variables jointly influence GDP, it is because of the p-value which is less than five percent. Finally, R-square value 72.13% indicates that approximately 72% variation in GDP can be explained by natural gas reserve, production, price, and export.

4.3.1.1. Discussion

From the economic perspective, the study concludes that crude oil variables jointly have a significant impact on economic growth, GDP, in the Caspian Sea region; it rejects the null hypothesis. Surprisingly, among crude oil variables, only crude oil price has a significant individual impact on economic growth and rest of the variables do not have an individual impact, but jointly they have. So, any change (increase or decrease) in crude oil variables—reserve, production, price, and export—jointly would affect the economic condition of the region. Whereas, individually, only crude oil price can affect the economic growth in the region.

Likewise, natural gas variables also jointly have a significant impact on economic growth, GDP, in the Caspian Sea region; it also rejects the null hypothesis. Here, among natural gas variables, only natural gas production has a significant individual impact on economic growth where other variables do not have. Therefore, the takeaway of the findings is that any adjustment in natural gas variables—reserve, production, price, and export—mutually would affect the economic position of the region. But, considering individual variable, only natural gas production has an influence on the Caspian Sea region's GDP.

4.3.2. Political perspectives

Table 4.4. *Regression analysis of crude oil production and political variables*

Dependent Variable: COPRO
Method: Least Squares
Sample (adjusted): 1998 2015
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	315.1866	105.2614	2.994322	0.0097
PS	-660.3181	688.4637	-0.959118	0.3538
GE	668.8669	1455.748	0.459466	0.6530
CC	-2566.684	2034.791	-1.261399	0.2278

R-squared	0.172114	Mean dependent var	329.477
Adjusted R-squared	-0.005290	S.D. dependent var	408.751
S.E. of regression	409.8307	Akaike info criterion	15.0625
Sum squared resid	2351457.	Schwarz criterion	15.2603
Log likelihood	-131.5625	Hannan-Quinn criter.	15.0897
F-statistic	0.970183	Durbin-Watson stat	0.89896
Prob(F-statistic)	0.434384		

Source: *Eviews (authors' computation)*

In the above table, the upper part of the second column shows the coefficient of independent variables. The coefficient value of political stability is -660.31 which denotes that one unit increase in political stability leads to decrease in crude oil production by 660 units considering everything else fixed though it is not statistically significant. The same interpretation lies for control of corruption considering the different value of the coefficient. On the other hand, one unit increase in government effectiveness leads to increase in crude oil production holding other variables fixed, this is also insignificant. In addition, in the above regression model, F-statistics shows that all independent variables (political stability, government effectiveness, control of corruption) jointly do not influence crude oil production. Lastly, the R-square value indicates that only 17.21% variation in crude oil production can be explained by the independent variables.

Table 4.5. *Regression analysis of crude oil price and political variables*

Dependent Variable: COP
Method: Least Squares
Sample (adjusted): 1998 2015
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.794914	4.888492	0.776295	0.4505
PS	21.17265	31.97325	0.662199	0.5186
GE	-65.90652	67.60704	-0.974847	0.3462
CC	11.47359	94.49864	0.121415	0.9051

R-squared	0.093788	Mean dependent var	1.7514
Adjusted R-squared	-0.100401	S.D. dependent var	18.144
S.E. of regression	19.03313	Akaike info criterion	8.9233
Sum squared resid	5071.640	Schwarz criterion	9.1212
Log likelihood	-76.31032	Hannan-Quinn criter.	8.9506
F-statistic	0.482972	Durbin-Watson stat	2.0850
Prob(F-statistic)	0.699413		

Source: *Eviews (authors' computation)*

The table 4.5 represents the results of regression analysis of crude oil price, dependent variable, and independent variables—political stability, government effectiveness, and control of corruption. Individually, each independent variable has no significant impact on the crude oil price which can be concluded by observing p-value. The coefficient of political stability is 21.17 which indicates one unit increase in the variable leads to increase in crude oil price by 21.17 units holding everything else fixed, but it is not statistically significant. This interpretation is the same for other independent variables, too. Now, importantly, in this regression model, all independent variables jointly do not influence dependent variable, crude oil price, because of the F value which is more than five percent. Finally, the R-square value is also weak considering the model, it indicates that only 9.3% variation in crude oil price can be explained by the independent variables which is very insignificant.

Table 4.6. *Regression analysis of crude oil price and political variables*

Dependent Variable: COEX
Method: Least Squares
Sample (adjusted): 1998 2015
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2608.235	1989.297	1.311134	0.2109
PS	-14577.25	13011.03	-1.120376	0.2814
GE	-1944.996	27511.65	-0.070697	0.9446
CC	-13567.16	38454.78	-0.352808	0.7295

R-squared	0.106483	Mean dependent var	2548.65
Adjusted R-squared	-0.084985	S.D. dependent var	7435.72
S.E. of regression	7745.241	Akaike info criterion	20.9406
Sum squared resid	8.40E+08	Schwarz criterion	21.1385
Log likelihood	-184.4661	Hannan-Quinn criter.	20.9679
F-statistic	0.556141	Durbin-Watson stat	1.10296
Prob(F-statistic)	0.652514		

Source: *Eviews (authors' computation)*

Table 4.6 demonstrates that the coefficient value of the all independent variables are negative. Here, the coefficient of political stability -14577 indicates that one unit increase in the variable leads to decrease in crude oil export by 14577 units considering other variables fixed, though it is not statistically significant. The alike interpretation goes for other independent variables. Now, considering the F value, the independent variables mutually have no impact on crude oil export because the F value is 0.6825 which is more than five percent. In completion, taking the R-square value in consideration, the model illustrates that only 10.64% variation in crude oil export can be explained by the independent variables.

Table 4.7. *Regression analysis of natural gas production and political variables*

Dependent Variable: NGPRO
Method: Least Squares
Sample (adjusted): 1998 2015
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	954212.0	328104.0	2.908261	0.0115
PS	-710371.2	2145969.	-0.331026	0.7455
GE	-10539743	4537624.	-2.322745	0.0358
CC	6326858.	6342525.	0.997530	0.3354

R-squared	0.289109	Mean dependent var	653705.
Adjusted R-squared	0.136776	S.D. dependent var	137494.
S.E. of regression	1277458.	Akaike info criterion	31.1517
Sum squared resid	2.28E+13	Schwarz criterion	31.3496
Log likelihood	-276.3660	Hannan-Quinn criter.	31.1790
F-statistic	1.897869	Durbin-Watson stat	2.84286
Prob(F-statistic)	0.176379		

Source: *Eviews (authors' computation)*

Table 4.7 represents the results of regression analysis of dependent variable, Natural gas production, and independent variables—political stability, government effectiveness, and control of corruption. Individually, each independent variable, except government effectiveness, has no significant influence on the natural gas production which can be determined by observing probability value. The coefficient of government effectiveness is -10539743 which indicates one unit increase in the variable leads to decrease in crude oil price by 10539743 units considering everything else fixed; it is statistically significant. This interpretation is the same for other independent variables, but surprisingly, these are statistically insignificant. In this regression model, all independent variables jointly do not influence dependent variable, natural gas production, because of the F value which is more than five percent. Finally, the R-square value is only 28.91% which indicates that only 28.91% variation in natural gas production can be explained by the independent variables which is considerably low.

Table 4.8. *Regression analysis of natural gas price and political variables*

Dependent Variable: NGP
Method: Least Squares
Sample (adjusted): 1998 2015
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.105508	0.498155	0.211798	0.8353
PS	1.407134	3.258190	0.431876	0.6724
GE	-3.936320	6.889404	-0.571359	0.5768
CC	8.760381	9.629756	0.909720	0.3784

R-squared	0.073315	Mean dependent var	0.0086
Adjusted R-squared	-0.125260	S.D. dependent var	1.8284
S.E. of regression	1.939545	Akaike info criterion	4.3559
Sum squared resid	52.66570	Schwarz criterion	4.5537
Log likelihood	-35.20323	Hannan-Quinn criter.	4.3831
F-statistic	0.369206	Durbin-Watson stat	2.4518
Prob(F-statistic)	0.776417		

Source: *Eviews (authors' computation)*

From the above table, we can depict the same three observations to interpret the regression model. In the first part, the coefficient value of each independent variables make some interesting observations. The coefficient value of political stability indicates that one unit increase in the variable leads to increase the natural gas price by 1.40 units considering other variables constant. This same interpretation goes for control of corruption, but not for government effectiveness variable because it has an opposite interpretation—one unit increase in government effectiveness leads to decrease in natural gas price by 3.93 units holding everything else fixed. The second part shows F-statistics, it denotes that the independent variables jointly has no impact on natural gas price because here the p-value is 0.7764 which is more than five percent. Finally, the R-square value only 7.3% which represents that only 7.3% variation in natural gas price can be explained by the independent variables.

Table 4.9. *Regression analysis of natural gas export and political variables*

Dependent Variable: NGEX
Method: Least Squares
Sample (adjusted): 1998 2015
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3756.701	75802.70	-0.049559	0.961
PS	-452559.5	495788.6	-0.912807	0.376
GE	-884964.8	1048339.	-0.844159	0.412
CC	956455.6	1465330.	0.652724	0.524

R-squared	0.105219	Mean dependent var	-26485
Adjusted R-squared	-0.086519	S.D. dependent var	28314
S.E. of regression	295134.5	Akaike info criterion	28.22
Sum squared resid	1.22E+12	Schwarz criterion	28.41
Log likelihood	-249.9924	Hannan-Quinn criter.	28.24
F-statistic	0.548764	Durbin-Watson stat	2.424
Prob(F-statistic)	0.657135		

Source: *Eviews (authors' computation)*

In a similar way, we can interpret the above table that we discussed before. Considering the coefficient value of the all independent variables, the coefficient of political stability -452559.5 indicates that one unit increase in the variable leads to decrease in natural gas export by 452559.5 units holding other variables fixed, though it is not statistically significant. The same interpretation goes for other independent variables. Now, considering the F value, the independent variables mutually have no impact on natural gas export because the F value is 0.6571 which is more than five percent. In completion, taking the R-square value into consideration, the model illustrates that only 10.52% variation in natural gas export can be explained by the independent variables.

4.3.2.1. Discussion

From political perspective, in the study, no significant regression model has been found considering the political variables—political stability, government effectiveness, and control of corruption—which jointly has a significant impact on crude oil production, crude oil price, crude oil export, natural gas production, natural gas price, and natural gas export. Surprisingly, a single most striking observation to emerge from the analysis, i.e., a

significant impact of government effectiveness, individually, on natural gas production. It implies that increasing or decreasing natural gas production in the Caspian Sea region is influenced by government effectiveness. In other words, it could be anticipated that a strong government effectiveness will stable the natural gas production volatility.

4.4. Granger Causality Analysis

Granger causality was first proposed by Professor Clive W.J. Granger in 1965 which tests the direction of causation for time series data. It denotes causation of two variables where one variable is cause for another variable and vice-versa. In a more precise way, Granger causality inspects whether a variable Y can help to forecast another variable X, if it can then we can say Y Granger causes X; otherwise, Y does not granger cause X (Du, Yanan & Wei, 2010).

In this finding and analysis part, the study illustrates and discusses Granger Causality of paired variables of crude oil and natural gas in the Caspian Sea region from two perspectives: economic and political. The findings and analysis are discussed below:

4.4.1. Economic perspective

Table 4.10. *Granger Causality test of GDP and crude oil price*

Pairwise Granger Causality Tests
Sample: 1997 2015
Lags: 2

Null Hypothesis:	Obs.	F-Statistic	Prob.
COP does not Granger Cause GDP	16	3.66813	0.06
GDP does not Granger Cause COP		4.06009	0.04

Source: *Eviews (author' computation)*

Looking at table 4.10, crude oil price does not Granger cause GDP, but, GDP does Granger cause crude oil price because the p-value is less than five percent which proves its statistical significance. This causality test shows a unidirectional causal relationship between GDP and crude oil price. However, the direction turned to bilateral if the study would have considered 10% level of significance.

Table 4.11. *Granger Causality test of GDP and crude oil export*

Pairwise Granger Causality Tests
Sample: 1997 2015
Lags: 2

Null Hypothesis:	Obs.	F-Statistic	Prob.
COEX does not Granger Cause GDP	16	0.58534	0.573
GDP does not Granger Cause COEX		4.93429	0.029

Source: *Eviews (author' computation)*

In the above table, a unidirectional causality relation has been found between GDP and crude oil export which is significant at 2.9% probability because the p-value is less than five percent. It indicates that GDP affects crude oil export, but crude oil export does not affect GDP. In other words, GDP Granger causes crude oil export, however, crude oil export does not Granger cause GDP.

Table 4.12. *Granger Causality test of GDP and natural gas price*

Pairwise Granger Causality Tests
Sample: 1997 2015
Lags: 3

Null Hypothesis:	Obs.	F-Statistic	Prob.
NGP does not Granger Cause GDP	15	4.47730	0.040
GDP does not Granger Cause NGP		0.19680	0.895

Source: *Eviews (author' computation)*

Referring to table 4.12, a unilateral causal relationship can be seen between natural gas price and GDP which is statistically significant at five percent level, it means that natural gas price does affect GDP, but GDP does not affect the natural gas price. In other words, the natural gas price can help to forecast GDP but GDP cannot help to forecast natural gas price.

Table 4.13. *Granger Causality test of GDP and natural gas export*

Pairwise Granger Causality Tests
Sample: 1997 2015
Lags: 5

Null Hypothesis:	Obs.	F-Statistic	Prob.
NGEX does not Granger Cause GDP	13	38.1912	0.025
GDP does not Granger Cause NGEX		1.80252	0.394

Source: *Eviews (author' computation)*

In examining the results of the table 4.13, a granger cause has been founded between natural gas export and GDP which is statistically significant. The single most interesting findings to emerge from the test is alike to the other pair tests; a unidirectional causal relationship.

4.4.1.1. Discussion

The findings of Granger causality test from the economic perspective have been illustrated above, only those which have at least one unidirectional Granger cause. Here, table 4.10 shows that GDP does Granger cause crude oil price; it is statistically significant because it rejects the null hypothesis at five percent level of significance. Now, if the study had considered ten percent level of significance then the opposite direction—crude oil price does Granger cause GDP—could also have been statistically significant. Alongside, the findings also mention that GDP does Granger cause crude oil export which explains how GDP affects crude oil export. It denotes that movements in GDP do affect the movements in crude oil export, but it is incompatible with the opposite direction.

On the other hand, considering natural gas and GDP, natural gas price and export do have Granger cause GDP; it is also statistically significant at five percent level because both of the models reject the null hypothesis. It is notable that the models are significant when they consider lags difference 3 and 5 for the natural gas price and natural gas export respectively. Therefore, the findings of this study suggest that an oscillation in natural gas price and export do affect the GDP in the Caspian Sea region which means the fluctuation of natural gas price affects GDP in the region; it is similar for natural gas export.

4.4.2. Political perspective

Table 4.14. *Granger Causality test of crude oil production and political stability*

Pairwise Granger Causality Tests
Sample: 1997 2015
Lags: 5

Null Hypothesis:	Obs.	F-Statistic	Prob.
COPRO does not Granger Cause PS	13	1.12902	0.531
PS does not Granger Cause COPRO		35.2115	0.027

Source: *Eviews (author' computation)*

The table 4.14 presents an experimental Granger causality data on crude oil production and political stability. The results are quite revealing in two ways. Firstly, as the other Granger causality tests above, it shows a unidirectional causal relation between political stability and crude oil production. Secondly, this relationship is significant at five percent level. To put it another way, political stability Granger causes crude oil production significantly.

Table 4.15. *Granger Causality test of crude oil price and political stability*

Pairwise Granger Causality Tests
Sample: 1997 2015
Lags: 2

Null Hypothesis:	Obs.	F-Statistic	Prob.
COP does not Granger Cause PS	16	4.10147	0.04
PS does not Granger Cause COP		0.12002	0.88

Source: *Eviews (author' computation)*

In the table 4.15, there is a clear unilateral direction of causality between crude oil price and political stability. This outcome is explicitly significant at five percent level. It explains that crude oil price affects political stability; to put it simply, which denotes that crude oil price Granger causes political stability. Unfortunately, the opposite direction, PS>COP, does not have any significant causality.

Table 4.16. *Granger Causality test of crude oil price and government effectiveness*

Pairwise Granger Causality Tests
Sample: 1997 2015
Lags: 2

Null Hypothesis:	Obs.	F-Statistic	Prob.
COP does not Granger Cause GE	16	0.20516	0.81
GE does not Granger Cause COP		9.28496	0.00

Source: *Eviews (author' computation)*

As table 4.16 shows that there is a significant causal relationship between government effectiveness and crude oil price at the p = 0.05 level. It indicates that government effectiveness Granger causes crude oil price—government effectiveness can help to forecast crude oil price.

Table 4.17. *Granger Causality test of crude oil export and government effectiveness*

Pairwise Granger Causality Tests
Sample: 1997 2015
Lags: 2

Null Hypothesis:	Obs.	F-Statistic	Prob.
COEX does not Granger Cause GE	16	3.22185	0.07
GE does not Granger Cause COEX		7.21354	0.01

Source: *Eviews (author' computation)*

From the table 4.17, it can be seen that there is a unilateral causality between government effectiveness and crude oil export which is significant at five percent level. The results indicate that crude oil export does not affect government effectiveness, but government effectiveness does affect crude oil export.

Table 4.18. *Granger Causality test of crude oil production and political stability*

Pairwise Granger Causality Tests
Sample: 1997 2015
Lags: 1

Null Hypothesis:	Obs.	F-Statistic	Prob.
COPRO does not Granger Cause CC	17	4.74867	0.046
CC does not Granger Cause COPRO		0.71149	0.413

Source: *Eviews (author' computation)*

It is apparent from the above table that the Granger causality test has found a unidirectional causal relation which is significant at five percent level. The most striking observation to emerge from the test is that crude oil production does cause control of corruption; in other words, crude oil production affects control of corruption.

Table 4.19. *Granger Causality test of natural gas price and political stability*

Pairwise Granger Causality Tests
Sample: 1997 2015
Lags: 5

Null Hypothesis:	Obs.	F-Statistic	Prob.
NGP does not Granger Cause PS	13	0.69290	0.67
PS does not Granger Cause NGP		54.8649	0.01

Source: *Eviews (author' computation)*

Results from the table 4.19 can be compared with the results of other tables which also represent a unilateral granger cause between paired variables. The table demonstrates a unidirectional causal relationship between political stability and natural gas price; it means that political stability does affect the natural gas price. Simply to say, political stability can help to forecast natural gas price.

Table 4.20. *Granger Causality test of natural gas export and control of corruption*

Pairwise Granger Causality Tests
Sample: 1997 2015
Lags: 3

Null Hypothesis:	Obs.	F-Statistic	Prob.
NGEX does not Granger Cause CC	15	4.50601	0.03
CC does not Granger Cause NGEX		0.33902	0.79

Source: *Eviews (author' computation)*

The table 4.20 illustrates granger causality test between natural gas export and control of corruption. It indicates that there is a unilateral causal relationship between natural gas export and control of corruption which is statistically significant at five percent level. In other words, it explains that natural gas export does affect control of corruption.

4.4.2.1. Discussion

Taking consideration of political perspectives, the findings of the Granger causality test show seven pairs which have a unilateral significant causal relationship between them. However, there are some other pairs which have also been tested, but unfortunately, the test could not find any statistical granger cause between them. Here, considering crude oil, table 4.14 illustrates that political stability does Granger cause crude oil production, it elucidates that higher political stability in the Caspian Sea region leads to higher crude oil production and vice versa. Alongside, this same crude oil production does Granger cause control of corruption (table 4.18) which explains that higher crude oil production leads to higher control of corruption in the region and vice versa. On the other hand, as with crude oil production, crude oil price affects political stability (table 4.15) means increasing or decreasing crude oil price leads to more or less political stability in the Caspian Sea region. In addition, it is also noticeable that government effectiveness does affect crude oil price (table 4.16) in the region though there is other variables and countries condition also linked with the crude oil price because it is a world price. However, the world crude oil price somehow linked with the political stability and government effectiveness in the Caspian Sea region. Finally, the table 4.17 shows that government effectiveness does Granger cause crude oil export which explains that more government effectiveness leads to higher crude

oil export in the region and vice versa. So, if the region wants to export more crude oil then the government needs to be more effective.

Now, considering natural gas, political stability does affect natural gas price (table 4.19) in the Caspian Sea region, in other words, oscillation of political stability leads to fluctuation of natural gas price. Finally, natural gas export does Granger cause control of corruption; it affects corruption significantly because of the rejection of null hypothesis at five percent level. The findings explain that more export of natural gas leads to control of corruption in the region.

4.5. Economic and Political Variables with no Granger Cause

Table 4.21. *List of no pairwise granger cause in economic and political variables*

Direction of causality	***p*-value**	**Hypothetical outcomes**	**Findings**
Economic perspective			
COR>GDP	0.2659	Do not reject null hypothesis	COR does not cause GDP
GDP>COR	0.4857	Do not reject null hypothesis	GDP does not cause COR
COPRO>GDP	0.4359	Do not reject null hypothesis	COPRO does not cause GDP
GDP>COPRO	0.3264	Do not reject null hypothesis	GDP does not cause COPRO
NGR>GDP	0.2450	Do not reject null hypothesis	NGR does not cause GDP
GDP>NGR	0.2724	Do not reject null hypothesis	GDP does not cause NGR
NGPRO>GDP	0.4246	Do not reject null hypothesis	NGPRO does not cause GDP
GDP>NGPRO	0.9436	Do not reject null hypothesis	GDP does not cause NGPRO
Political perspective			
COEX>PS	0.7039	Do not reject null hypothesis	COEX does not cause PS
PS>COEX	0.6206	Do not reject null hypothesis	PS does not cause COEX
COPRO>GE	0.1435	Do not reject null hypothesis	COPRO does not cause GE
GE>COPRO	0.9945	Do not reject null hypothesis	GE does not cause COPRO
COP>CC	0.8517	Do not reject null hypothesis	COP does not cause CC
CC>COP	0.1528	Do not reject null hypothesis	CC does not cause COP
COEX>CC	0.1352	Do not reject null hypothesis	COEX does not cause CC
CC>COEX	0.0888	Do not reject null hypothesis	CC does not cause COEX
NGPRO>PS	0.0837	Do not reject null hypothesis	NGPRO does not cause PS
PS>NGPRO	0.1586	Do not reject null hypothesis	PS does not cause NGPRO
NGEX>PS	0.6400	Do not reject null hypothesis	NGEX does not cause PS
PS>NGEX	0.6980	Do not reject null hypothesis	PS does not cause NGEX
NGPRO>GE	0.4450	Do not reject null hypothesis	NGPRO does not cause GE

GE>NGPRO	0.4871	Do not reject null hypothesis	GE does not cause NGPRO
NGP>GE	0.4929	Do not reject null hypothesis	NGP does not cause GE
GE>NGP	0.1261	Do not reject null hypothesis	GE does not cause NGP
NGEX>GE	0.4321	Do not reject null hypothesis	NGEX does not cause GE
GE>NGEX	0.6761	Do not reject null hypothesis	GE does not cause NGEX
NGPRO>CC	0.8159	Do not reject null hypothesis	NGPRO does not cause CC
CC>NGPRO	0.8024	Do not reject null hypothesis	CC does not cause NGPRO
NGP>CC	0.7416	Do not reject null hypothesis	NGP does not cause CC
CC>NGP	0.2284	Do not reject null hypothesis	CC does not cause NGP

Source: *Eviews (authors' computation)*

This table 4.21 is quite revealing some different results, it only depicts the pairs which have no significant causal relationship between them. The results can be explained from two perspectives: economic and political. From the economic perspective, it shows no granger cause among GDP, crude oil reserve, crude oil production, natural gas reserve, and natural gas production. On the other hand, from the political perspective, it elucidates no causality among crude oil export, crude oil production, crude oil price, natural gas export, natural gas price, natural gas production, political stability, government effectiveness, and control of corruption.

4.5.1.1. Discussion

Statistically, these pairs do not affect each other; the main statistical reason behind this is the p-value—more than five percent, which demonstrates an insignificant relationship between pairs. To put it simply, they are failed to reject the null hypothesis. Therefore, a possible interpretation of these results could be the absence of the causal relationship between the pairs in the Caspian Sea region. This indicates whether a variable's value in a pair increase or decrease, it does not have any effect on other variable or it cannot help to forecast the other variables. For instance, increasing or decreasing crude oil price does not affect GDP fluctuation which is also alike for opposite direction.

4.6. SWOT ANALYSIS

To ascertain the strengths, weaknesses, opportunities, and threats, the study conducts SWOT analysis. The main reason behind the analysis is to identify the region's capability, what it can or cannot do considering internal and external factors—understanding its strengths and weaknesses, and what opportunities it has as well as what types of threats it may experience.

Table 4.22. *SWOT analysis of the Caspian Sea region*

Strength	Weakness
• Abundance of natural gas and crude oil reserve (Yergin 2012, p. 44). • Essential geographical position between Europe and Asia, and strategically important for military and economic reasons for ages (Coffee, 2015, para. 1). • Massive energy demand of East and West countries on the region, especially EU dependency on the Caspian Sea region (Baran 2007, p. 132). • Huge FDI inflow for energy sector (Lin, 2010, pp. 9-11; Emadi & Nezhad, 2011, p. 25) • Encompassed by countries that have a strong position in energy market as well as strong influence in world geopolitics (Jonson, 2001, p. 12). • Origin of some world's most strategic pipelines such as Southern Corridor, TAPI pipeline, Trans Caspian pipeline, Nabucco pipeline, Central Asia-China Gas Pipeline, and so on (Baran 2007, pp. 132-139). • Presence of renowned oil and gas companies, e.g., Gazprom, Lukoil, NIOC, SOCAR, Turkmengaz, KazMunaiGas, and	• High transportation and exploitation cost (Gelb, 2005, p. n.d; Emadi & Nezhad, 2011, p. 25) • Dearth of developed crude oil and natural gas exploitation technology (Feller, 1996, p. 39) • Maritime border dispute among coastal states in the Caspian Sea region (Benke, 2010, p. 17) • Significant political instability in the region's countries (Benke, 2010, p. 19) • Absence of good relation among the littoral states in the region ("Autonomy," n.d., para. 21-24). • Presence of extreme corruption in the countries in the region (Meissner, 2010, pp. 19-20). • Local dynamics threaten to overturn pipelines scheme and project (Jonson, 2001, p. 12). • Weak states, severe social and economic condition, ethic and regional division (Kubicek, 2013, p. 2). • Absence of sea route for exporting crude oil and natural gas (Kubicek, 2013, p. 2).

so on. • Strong military power, e.g., Russia and Iran and military development in the region (Shlapentokh, 2013, pp. 155-157)	• More dependency on international companies for exploitation of crude oil and natural gas. • Economic growth mostly depend on crude oil and natural gas (Jonson, 2001, p. 12).
Opportunity	**Threat**
• Technological development in oil and gas sector (Neal et al., 2007, p. 1). • Increasing demand of crude oil and natural gas in the world energy market. • Possibility of being the market leader in natural gas sector for huge its huge reserve. • Raising attention of national and international energy companies (Emadi & Nezhad, 2011, p. 25) • Increasing crude oil and natural gas pipelines routes from the Caspian to external markets, e.g. European energy market (Jonson, 2001, p. 12). • Presence of political turmoil and domestic violence in most of the Middle East countries. • Expansion of transit infrastructures in the region (Pritchin, 2016, p. 117) • Energy prospect of the region can alleviate conflict between West countries and regional states.	• Discovering of new crude oil and natural gas field in different region; e.g. Africa, South America, North America and so on. • Political Presence of foreign power in the region, especially the United States (Kubicek, 2013, p. 5). • Tension of emerging intergovernmental military alliance (such as NATO) in the region ("Autonomy," n.d., p. 11). • Increasing international terrorism as well as political and religious extremism (Baev, 2011, para. 2). • Increasing geopolitical competition and/or rivalry between Russia and Western countries as well as Iran and Western world ("Autonomy," n.d., p. 12). • A warry look of Middle East at the Caspian Sea region (Jonson, 2001, p. 17). • Security vulnerability in Central Asia and Caucasus (Jonson, 2001, p. 12). • Crude oil and natural gas price volatility • Having economic sanction on shoulder—two of major countries in the Caspian Sea region e.g., Russia and Iran.

Source: *Authors' findings*

4.6.1.1. Discussion

Considering the internal factors—strength and weakness, the Caspian Sea region has some enormous strengths, especially its abundance of energy sources, strategic geographical position, the massive energy demand of East and West, and so on. Alongside, the noticeable part is that it has also some significant weaknesses which create a vulnerable situation for the region—high transportation cost, political instability, corruption, and so on. This high transportation cost is because of the absence of sea routes from the Caspian Sea region to the European and Asian energy market. Actually, the region totally depend on pipelines for transportation of energy which makes the transportation cost expensive. On the other hand, due to the absence of real participation of citizens in the politics, there are some depressed anger on incumbent government among the citizens which makes the political system more vulnerable in the region, especially in Azerbaijan, Kazakhstan, and Turkmenistan. However, these weaknesses might turn to its strength if the countries in the region cooperate each other to alleviate these weaknesses and ensure a proportionally equal common ground for securing the crude oil and natural gas of the region.

On the other hand, considering the external factors, the region can utilize its opportunities properly to ensure a significant development—especially by attracting foreign investors to invest in the energy sector, using the best technologies to increase the productivity, developing the pipeline policy, and so on. It can also take advantage of the huge demand for energy over the world. This huge demand might lead the region to play a major key role in the energy market, especially Asian and European markets. As with opportunities, it has some strategic and conspicuous threats which may shove the region at a worrisome condition. For example, discovering new crude oil and natural gas field, increasing international terrorism as well as political and religious extremism, presence of foreign power in the region, especially the United States, and so on. Actually, the presence of United States in the corner of the region due to the prominent member of NATO escalates the geopolitical rivalry between Russia and United States, especially for the Russia-Ukraine crisis. On the other hand, sanctions on Russia and Iran also escalate the tension in the region which is a major threat for the region because of the insurgency groups (Caucasus Emirate, Mujahedin E Khalq (MEK), Forest Brothers and so on) which can boost insurgency by creating chaos in the region. Therefore, taking into consideration

of these threats, the region can initiate various programs to ameliorate the upcoming difficulties from those threats. It could be collaboration, cooperation and/or negotiation with the countries and regions, which may be the cause of threats, to convert the threats into strengths.

CHAPTER FIVE

5. CONCLUSION

5.1. Introduction

As discussed before, the Caspian Sea region is one of the oldest regions of oil production in the world. Alongside, it is an important strategic participant in the world energy market and politics. Due to the abundance of crude oil and natural gas reserve, it has got international attention and penetrated in international politics (Yergin 2012, p. 44). According to EIA, the Caspian basin has (proved and probable reserves) approximately 48 billion barrels of oil and 292 trillion cubic feet of natural gas which illustrates how strategically important the region is to the world energy market. This reserve also shows how much strength the region has considering the other regions, e.g., Persian Gulf. In addition, the strategic location—between Asia and Europe—of the region possesses a crucial place on the world map. Therefore, the abundance of crude oil and natural gas, geopolitical importance, and strategic geolocation have brought the region as a crucial and significant player to world energy market and geopolitics, especially to the eastern and western countries.

The world's most powerful countries from East and West are competing to increase their influence over the region. In this continuation, Russia—verily the most significant partner country in the region—concerns about this region because of its energy market monopoly. After collapsing the Soviet Union, though newly liberated countries (Azerbaijan, Kazakhstan, and Turkmenistan) act independently, their energy exports mostly depend on Russia because of the crude oil and natural gas pipelines. Russia is the biggest exporter in Europe energy market. According to European Commission, in 2007, the European Union imported around 185 million tons of crude oil and 100.7 million tons of oil equivalents of natural gas which accounted for 32.6% and 38.7% of total oil and natural gas import of EU respectively. On the other hand, the USA is also a major strategic player in the Caspian region; it is not because of oil and so-called democracy which is always asserted. The interest of USA on Caspian Sea region firstly because of its nature; moreover, preventing Russia's energy domination from the oil and gas market as well as isolating Iran from the Central Asian energy market (Blank, 2008, pp. 73-76). Finally, China's interest

in the Caspian Sea is mainly because of domestic demand. According to Caspian report, China imports natural gas from Turkmenistan through Central Asia-China Gas Pipeline which started in 2006 and accounts for around 40 billion cubic meters natural gas per year. Recently, in 2013, they signed a new agreement by which China imports 25 billion cubic meters more natural gas, total 65 billion cubic meters, and it will continue until 2020.

Now considering the significant importance of some other countries, Turkey also plays a vital role in the region. Here, verily, the involvement of Turkey is because of its huge energy demand and strategic partner of crude oil and natural gas pipelines of the Caspian Sea region. According to CIA Factbook, Turkey consumes more oil and natural gas than its production; its consumption is growing day by day. Needless to say, it already imports a significant amount of gas from Russia and it has a good relationship with other Caspian region's countries. Importantly, some significant Caspian region's crude oil and natural gas pipelines enter European markets through Turkey such as Trans-Anatolian Natural Gas Pipeline (TANAP), Baku-Tbilisi-Ceyhan Pipeline and so on which represents Turkey as an important player in the region. Finally, Japan, India, and Pakistan also became an important player in the region because of their energy demand. Actually, they import crude oil and natural gas from Caspian region. In this continuation, Trans-Afghanistan Pipeline—which will transport natural gas from Caspian region's Turkmenistan through Afghanistan to Pakistan and then India—will adjoin Caspian region with India and Pakistan. In summary, this significant amount of crude oil and natural gas demand, as well as the substantial geopolitical significance of East and West countries, accelerate the Caspian Sea region as one of the most important players in the world energy market and politics.

Now, considering a significant importance of the region, it is profoundly crucial to analyze the region's crude oil and natural gas as well as its domestic political influence on the energy as a whole. To do so, numerous studies conducted research on crude oil and natural gas impact on economic growth of Caspian Sea region's countries individually. But there is no such a study which explains the oil and natural impact on economic growth on Caspian Sea region as a whole. Likewise, the influence of politics on oil and natural gas in Caspian region as a whole is also absent. On the other hand, Most of the studies about

Caspian Sea region consider crude oil and natural gas price or production separately. This paucity of study on the Caspian Sea region as a whole obscures the importance of crude oil and natural gas of the region to the world.

Therefore, this study mostly deals with these three problems and evaluates the impact of crude oil and natural gas on economic growth as well as the influence of politics on crude oil and natural gas in Caspian Sea region as a whole. Alongside, it also considers most important variables of oil and natural gas— reserve, export, production, and price rather than using just one variable.

5.2. Overall Findings and Discussions

The findings of the study show a robust impact of crude oil and natural gas on economic growth on the Caspian Sea region. From economic perspectives, it concludes that crude oil variables jointly have a significant impact on economic growth in the Caspian Sea region; it rejects the null hypothesis. Surprisingly, among crude oil variables, only crude oil price has a significant impact on economic growth and rest of the variables do not have an individual impact, however, jointly they have. So, any change (increase or decrease) in crude oil variables—reserve, production, price, and export—jointly would affect the economic condition of the region. Whereas, individually, only crude oil price can affect the economic growth in the region. Likewise, natural gas's variables also jointly have a significant impact on economic growth in the Caspian Sea region. Importantly, it also rejects the null hypothesis. Here, among natural gas variables, only natural gas production has a significant individual impact on economic growth where other variables do not have. Therefore, the takeaway of the findings is that any adjustment in natural gas variables—reserve, production, price, and export—mutually would affect the economic condition of the region. But, considering individual variable, only natural gas production has an influence on the Caspian Sea region's economic growth. Now, from political perspective, verily, no significant regression model has been found considering the political variables—political stability, government effectiveness, and control of corruption—which jointly has a significant impact on crude oil production, crude oil price, crude oil export, natural gas production, natural gas price, and natural gas export. Surprisingly, a single most striking

observation to emerge from the analysis—i.e., there is a significant impact of government effectiveness on natural gas production individually.

Considering causal effect analysis, the study shows that GDP does Granger cause crude oil price; it is statistically significant because it rejects the null hypothesis at five percent level. However, if the study had considered 10% level of significance then the opposite direction—crude oil price does Granger cause GDP—could have been statistically significant. Here, the findings also mention that GDP does Granger cause crude oil export which explains how GDP affects crude oil export. It denotes that changes in GDP do affect the changes in crude oil export, but it is incompatible with the opposite direction. On the other hand, considering natural gas and GDP, natural gas price and export do Granger cause GDP; it is statistically significant at five percent level and for that reason, both of the models reject the null hypothesis. Now, Taking consideration of political perspectives, the findings of the Granger causality test show seven pairs which have a unilateral significant causal relationship between them. First of all, political stability does Granger cause crude oil production, it elucidates that higher political stability in the Caspian Sea region leads to higher crude oil production and vice versa. Alongside, this same crude oil production does Granger cause control of corruption which also explains that higher crude oil production leads to higher control of corruption in the region and vice versa. On the other hand, as with crude oil production, crude oil price granger causes political stability which denotes that increasing or decreasing crude oil price leads to vacillation of political stability in the Caspian Sea region. In addition, it is also notable that government effectiveness does affect, in other words, Granger cause crude oil price and export in the region which elucidates that more government effectiveness leads to higher crude oil price and export in the region and vice versa. If the region wants to have a higher price and more export of crude oil then the government needs to be more effective. Finally, considering natural gas, political stability granger causes natural gas price in the Caspian Sea region, in other words, oscillation of political stability leads to fluctuation of natural gas price. Alongside, natural gas export also granger causes control of corruption which denotes more export of natural gas leads to higher control of control of corruption in the region.

In the SWOT analysis, considering the internal factors—strength and weakness, the Caspian Sea region has some enormous strengths, especially its abundance of energy sources, strategic geographical position, the massive energy demand of East and West, and so on. Alongside, the noticeable part is that it has also some significant weaknesses which create a vulnerable situation for the region—high transportation cost, political instability, corruption, and so on. On the other hand, considering the external factors, the region can utilize its opportunities properly to ensure a significant development—especially by attracting foreign investors to invest in the energy sector, using the best technologies to increase the productivity, developing the pipeline policy, and so on. Finally, as with opportunities, it has some strategic and conspicuous threats which may shove the region at a worrisome condition. For example, discovering new oil and gas field, increasing international terrorism as well as political and religious extremism, the presence of foreign power in the region, especially the United States.

5.3. Recommendations

Considering the three research questions and the takeaways of the study, this part endeavors to illustrate some effective potential ways that the countries can consider for the further economic and political development of the region.

First of all, the countries of the region should introduce a proportionately equal playground where everyone can exercise their economic and political right properly. To do so, Russia and Iran should begin the process by resolving the regional energy-related disputes—especially the legal status of Caspian; Sea or Lake—among them, then they can gently patronize Azerbaijan, Kazakhstan, and Turkmenistan to come together and endeavor to develop the region in a most sophisticated way. However, it would not be that easy to ensure the cartel among them because there are some international players, e.g., the United States, who always interfere (as its nature) another countries' economic and political system in order to raise their influence and domination over the countries or regions. Nevertheless, for the development of the region, the countries should start a negotiation by keeping the differences aside. In addition, Russia should obliterate the Soviet Union's inherited mindset from their mind; should stop interfering with the political system of Azerbaijan, Kazakhstan, and Turkmenistan.

Secondly, due to the huge demand of crude oil and natural gas of Eastern and Western countries, they should develop a common energy market strategy and policy—for instance, setting reasonable crude oil and natural gas price standard, sharing developed technologies for energy drilling and refining among them, and establishing a mutual military base in the region for avoiding any unexpected critical situation—for the region where five countries of the region can experience a win-win situation. Verily, here, Russia should stop depriving Kazakhstan and Turkmenistan from the actual crude oil and natural gas price because of its geopolitical and economic power. Furthermore, as a powerful country, it has to avoid the possible internal energy disputes not only for the region but preventing the other international players from their interference into the region. For instance, the United States, EU who are eagerly waiting to ensure political instability which will benefit them considering geopolitical power and/or huge energy demand.

Thirdly, since the pipelines play an important role in supplying the crude oil and natural gas, the major countries, especially Russia and Iran, should be more resilience about the pipeline policy. For instance, Russia should not have reduced natural gas import dramatically from Turkmenistan after 2009. This dramatic reduction accelerated Turkmenistan to focus more on another pipeline (new importers), e.g., Alternative Central Asia and China Gas Pipeline, for their economic stability. As consequence, diplomatic tension arose between them because of the emergence of China in the region. Though China's foreign policy is not as the United States, it has economic and political competition with Russia in order to be, so-called, the world superpower which has created a tension in the region. Therefore, to avoid such unexpected situation, all five countries should prepare relatively an effective manifesto—any pipeline from Caspian basin should have mutual participation of all five countries in order that they can enjoy proportionately equal benefit from the pipeline, amount of crude oil and natural gas of offshore drilling from the Caspian Sea should be divided proportionately among five countries, and cost of all offshore drilling should bear by five countries proportionately—for this pipeline policy by considering other internal disputes.

Finally, the government of each country should concentrate more on corruption control which should be the highest priority not just for the country but for the region.

Doing so, the countries can choose a corruption control policies which have been successfully applied for controlling corruption in a country with an expected positive result; for example, Finland, Denmark, and Sweden have been consistently ranked less corrupted countries position in the world. Therefore, countries of the region should follow such countries' corruption control policies—i.e., disclosure of budget information, freedom of press, gender equality, public access of official documents, government openness and effectiveness, citizens' participation in the budget process, and publish minister's monthly spending of travel and gifts.

5.4. Final Remarks

In summary, the study has endeavored to discuss all the research questions and ensure the research objectives through some empirical and descriptive analysis. Here, it has found, on the one hand, some findings which evince the strong economic and political condition of the region. On the other hand, there are some other findings which ascertain some loopholes in the economic and political aspects where countries of the region should concentrate rigorously. Finally, though the findings of the study have conspicuously answered all the research questions and the recommendations have elucidated the possible steps which the region should consider, nothing will be changed or developed if the countries of the region do not keep their differences aside and begin the negotiation process among them as soon as possible. Otherwise, the Caspian Sea region might experience severe economic and political impediments in the near future as the Middle East.

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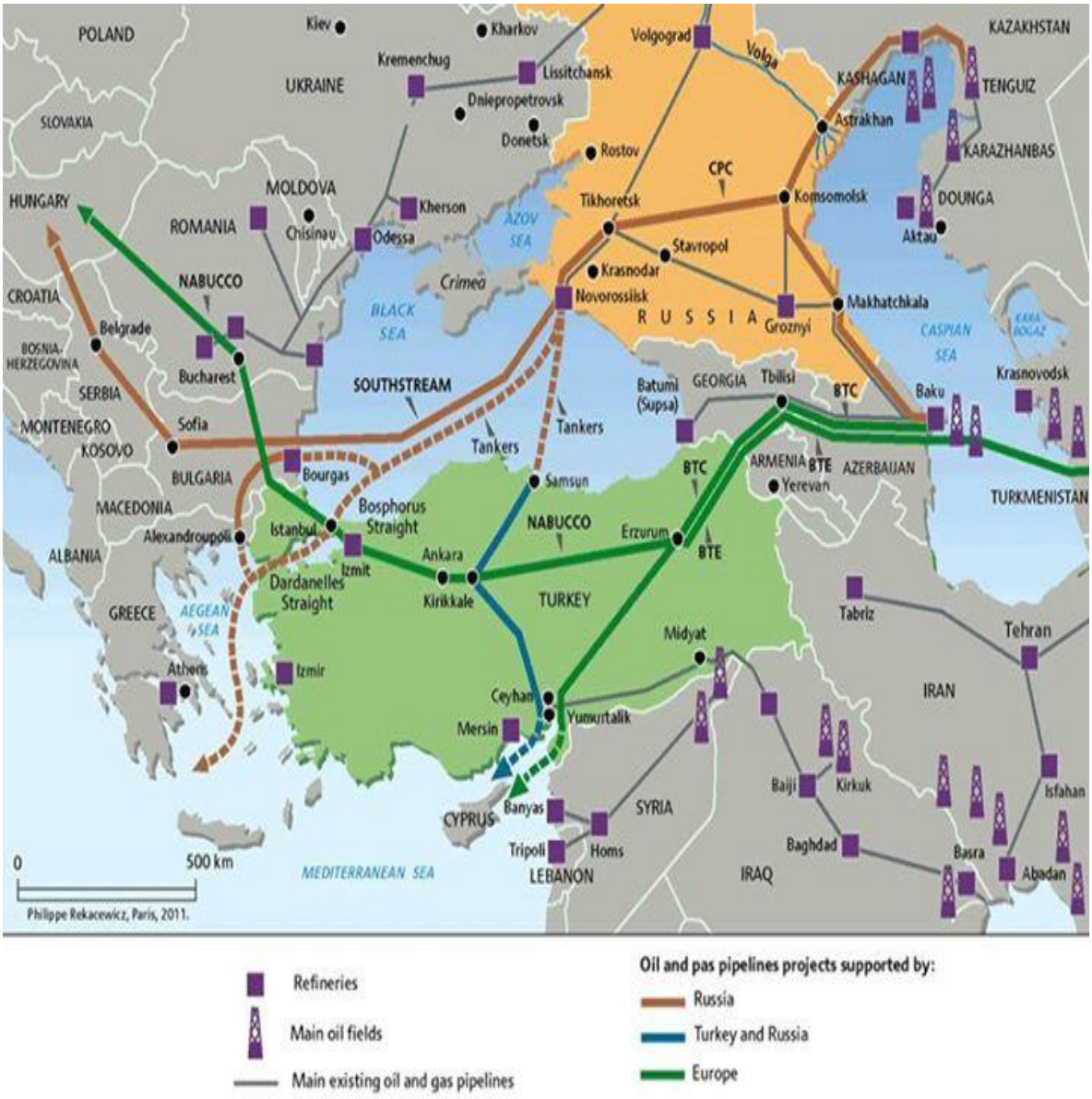
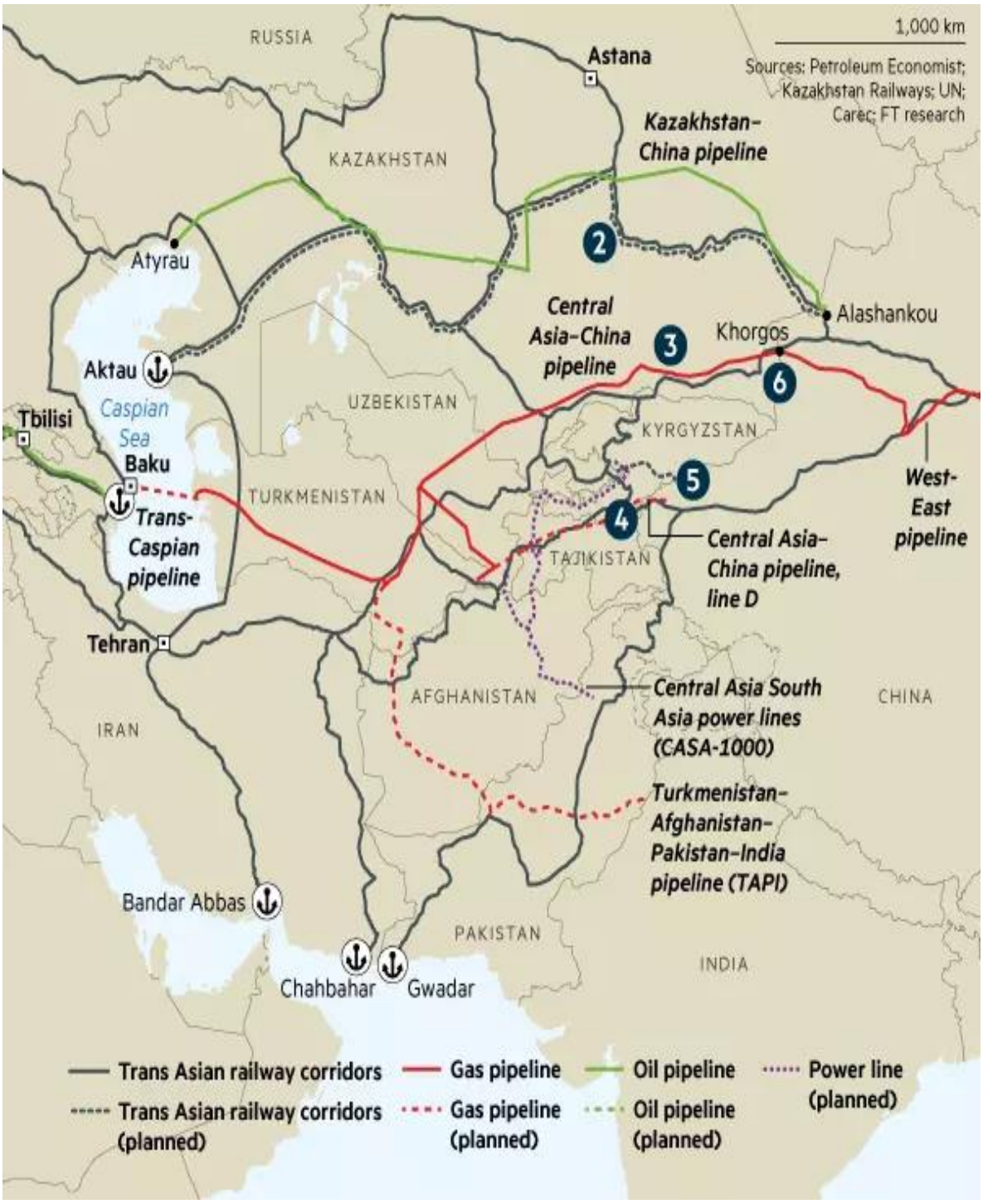
APPENDIXES

Appendix A

Pipelines of crude oil and natural gas from Caspian Sea region to West



Pipelines of crude oil and natural gas from Caspian Sea region to East



Appendix B

Unit root test (Augmented Dickey-Fuller)

Crude oil reserve time series

Null Hypothesis: D(COR) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.567248	0.0196
Test critical values:	1% level	-3.920350	
	5% level	-3.065585	
	10% level	-2.673459	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 16

Crude oil production time series

Null Hypothesis: D(COPRO) has a unit root
Exogenous: None
Lag Length: 6 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.965859	0.0070
Test critical values:	1% level	-2.792154	
	5% level	-1.977738	
	10% level	-1.602074	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 11

Crude oil price time series

Null Hypothesis: D(COP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.245009	0.0348
Test critical values:	1% level	-3.886751	
	5% level	-3.052169	
	10% level	-2.666593	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 17

Crude oil export time series

Null Hypothesis: D(COEX) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.976553	0.0486
Test critical values:	1% level	-2.708094	
	5% level	-1.962813	
	10% level	-1.606129	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 17

Natural gas reserve time series

Null Hypothesis: D(NGR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.768303	0.0018
Test critical values:	1% level	-3.886751	
	5% level	-3.052169	
	10% level	-2.666593	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 17

Null Hypothesis: D(NGPRO) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.965802	0.0086
Test critical values:	1% level	-3.886751	
	5% level	-3.052169	
	10% level	-2.666593	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 17

Natural gas production time series

Natural gas price

Null Hypothesis: D(NGP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.384605	0.0005
Test critical values:	1% level	-3.886751	
	5% level	-3.052169	
	10% level	-2.666593	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 17

Natural gas export

Null Hypothesis: D(NGEX) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.875451	0.0014
Test critical values:	1% level	-3.886751	
	5% level	-3.052169	
	10% level	-2.666593	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 17

Political Stability

Null Hypothesis: D(PS) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.370539	0.0005
Test critical values:	1% level	-3.886751	
	5% level	-3.052169	
	10% level	-2.666593	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 17

Government Effectiveness

Null Hypothesis: D(GE) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.508183	0.0016
Test critical values:	1% level	-2.708094	
	5% level	-1.962813	
	10% level	-1.606129	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 17

Control of Corruption

Null Hypothesis: D(CC) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.447372	0.0236
Test critical values:	1% level	-3.886751	
	5% level	-3.052169	
	10% level	-2.666593	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 17