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The investment challenges in the innovation economy: evidence from oil-exporting countries

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Acknowledgements

With this statement, I declare that the collection and presentation of all information in in the thesis is based on the principles of academic rules and ethical standards. I also declare, as a requirement of these rules and principles, that I present the source of all data, thoughts and results in the study that do not belong to me.

Firstly, I would like to thank my supervisor Ali Rustamov for endless encouragement from the last year who originally generated my love for science and life. He had set an example of excellence as a researcher, instructor and a role model for me. All of his guidance through this process; discussion, ideas and feedback have been absolutely invaluable. His way of teaching is always remarkable, believing in me being my academic advisor. As it is said about confidence: it's key, so thank him for unlocking opportunities for me.

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Abstract

With this thesis, we should ascertain whether adequate definitions can be provided in countries from innovational aspects. During the last years, investments in the innovation economy are becoming more rigorous, because oil resources are slowly dropping and countries need to grow.

The investigations will depict some principles and innovative changes in countries which are easily accessible for their sustainable growth. In our contemporary world, every country gives more efforts for integration and globalization to possess their high growth. However, economic analyses give access to determine differences between social business and traditional business.

In the innovation economy, social business also has an impact with the implementation of new business tools and techniques, living conditions to consider environment, people and social responsibilities.

In addition, they have started investing non-oil sectors in oil-exporting countries that are gaining more revenue from the oil sector, because natural resources will decrease day by day and it is not accomplished for sustainable development. Investing in the innovation economy can therefore pave the way for a bright future of economic growth and globalization.

After the global crisis and dropping oil prices, additionally according to United Nations technological advances, particularly in ICT, have significantly improved the competition driven by world economies ' globalization. The potential connections between research and development of transnational corporations and the host countries ' local innovation system. Countries turn invests to the research and development sector which is able to foster technology and do not do miserable

other fields in economic growth. In addition, they establish start up companies, solar power system, green technology, nanotechnology,

Additionally, we will find my probes for this bachelor thesis which I gained with attending on training in Kaunas and Vilnius in Lithuania, on the topic of investments in innovation economy and derived evidences from Schengen country.

Tax incentives inclination for investors Free Economic Zone pave a way for convenient trade, wealth creation and acquisition of innovative capabilities.

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Introduction

There is no better investment than the European Research, Innovation, and Education programs – (Tusk, D., 2017)

In our contemporary world globalization is a significant factor. From the macroeconomic aspect- all countries and from microeconomic perspective- to join this globalization, all organizations and companies prioritize integration. And its starting point is to negotiate with the European Union, the UN and other international organizations of this kind. But it is not enough in some cases because the economy of the country is not properly integrated. For the new economy-innovation economy, they exclude intensifications.

The economy of innovation shifts the focus of societies around the world. Instead of economies focused on developing and distributing valuable commodities from scarce resources, society's new goal is to improve the quality of life for all and expand wealth by developing new business models, products, services and forms of production.

Innovative management characterizes the introduction of the new things and the way that you make them and often in use. This could relate to the areas of information technology, systems, knowledge production, academic services, processes and cultural behaviour, institutional structures and their management. Therefore, effective change management can help prevent crises. Thus, if crises occur, an innovative approach can help survive.

Innovation began in the tech industry and snowballed rapidly into other economic sectors. With improved technological capabilities, more universally accessible knowledge bases, and a globalized world, individuals and firms were able to create products and services that improved people's lives more effectively.

It is important to know how it came about first in order to fully understand what the innovation economy has to be. In the last few decades alone decades has the theory of this form of economics been developed. Previously, economic growth was determined by market response to economic incentives on supply and demand curves as well as efficient resource allocation. And when the economy emerged from the Second Industrial Revolution, this made sense. However, as the pace of technological development increased, with digital technology in particular, everything changed.

While innovation is seen as an independent force in older economic models, innovation is seen as a central principle in innovation economics that should be encouraged by government policies and supported by knowledge, technology, and entrepreneurship. The main objective of economic policy should be to stimulate these factors, together with the development of effective private-public partnerships that trigger increased innovation and productivity. While capital was needed to advance the economy, was not the driver. Building more mills, plants, or factories is not being used. It has been used to invest and introduce new ones improved products and services in research and development. This is why the innovation economy is called a new economy and every organization or country seeking to invest as a traditional economy in innovative sectors rather than oil-sectors. We will proof shreds of evidence from oil-exporting countries who want to change transfer it because of some demerits: from financial and economic, legal, political aspects.

The price of oil can fluctuate which is hampering investments and financial stocks, ruining projects and ventures in these sectors. The foreign exchange gap while trading oil also affects the economy as a major issue.

Investing countries in the oil sector reforms to strengthen the commercial environment, education and skill acquisition (Callen et al. 2014). Attracting capital

flows to non-resource sectors may also encourage such efforts. While incremental diversification around resource sectors can help foster learning and the approval of new technologies. As a result, investments in the innovation economy is increased day-by-day.

Besides, the regression analysis results demonstrate that statistically there are significant effects of innovation management and all its dimensions in the change management, but the high effects of the maintaining the direction, risk, and challenge, while the lower one was fluency between dimensions of innovation management. Then, the conclusions specify that actually, innovation management and its dimensions play a dynamic role in change management.

After oil price shocking and descending some countries are fortunate to ameliorate their economy with natural resources in innovation, such as renewable energy.

We will discuss about if the differentiated variables contain co-integrated variables, we built the VECM model.

The VECM model obtains three important structures. First, we get the short-run coefficient matrices that include each variable's short-run adjustment parameters with themselves and the other variables at their own lag time. Second, we get the long-term cointegration matrix that presents the long-run equilibrium relationship in xt between variables. Furthermore, we also obtain the velocity matrix of the adjustment terms which is an error correction if the long-term equilibrium deviation is gradually adjusted by adjusting short-run.

Literature review

2.1.1 Investment classification

As a goal, investments are divided real and financial. Real Investment is the combination of investments into real economic assets (tangible and intangible resources). The first and most essential real investment component is the investment in capital form. Financial investments are different investments in financial assets (securities, stocks, etc.). They are speculative and long-term investments. Conjectural is calculated by accepting the reception of desirable income for a specified period (usually, short term). Long-term investments follow strategic targets investment in property management (Vitun, 2012: 145).

Physical investments are investments in the means of production. They are divided into strategic, basic, current and innovative. Strategic investments aim to create new initiatives. Main investments aim to expand existing fields of activity and create new initiatives and industries in the same field of activity or in the same area. Current investments are aimed at investing in fixed assets and continuing the reproduction process associated with renewing the stock of material and current assets. Innovative investments are devoted to investments in the modernization of the enterprise, including technical re-equipment and security investments (to create a structure that provides the company with an efficient raw material, documentation, etc.) (Lipsic, 2004: 19). The risk level is typical for each selected investment type. Existing investments are subject to the lowest risk as they are financed by depreciation. Innovation, if any, takes the greatest risk.

Investments in the form of capital investment according to Zimin (2006):

a. Defence investments aimed at reducing risk, maintaining price levels and implementing protective policies;

b. Malicious investments seek new technologies and developments to maintain a high scientific and technical level;

c. Social investments aim to improve labour force staff;

d. Compulsory investments aim to meet the state requirements (ecology, product safety, etc.);

e. Representative investments aim to create, maintain and improve the image of the organization.

 Capital investments may be divided into the following types (for the investor): investments aimed at changing equipment; investment in modernization aims to improve product quality and reduce costs; investments to increase production; investments aiming to diversify, building new activities and markets; strategic investments to ensure scientific and technological progress.

According to Senko (2012), capital investments in the direction of action are divided:

a. First (net attachments) when purchased, or establishment of the enterprise;

b. Intensive investment in capacity building;

c. Reinvestment is the investment of allocated funds;

d. Gross investment is a combination of investments, including investment and net investment.

There are direct and indirect (portfolio) investments. Direct investments are in the authorized capital of the initiative which aims to ensure the direct control and management of this initiative. A portfolio is a means of investing in economic assets to generate income and diversify risks (Tsibulnikova, 2015: 12).

There are short term (up to one year), medium-term (one to three years) and long term (more than three years) investments.

There are domestic and foreign investments related to the target of the investment. Domestic investment is used in the presence of the investor. Foreign investments focus on acquiring the assets of other economic assets.

There are special (non-state), state, foreign, joint (merger of domestic and foreign investors) by type of property.

On a regional basis, there are domestic (within a region or country) and foreign (investments to foreign companies or entities).

Industry-based manufacturing, agriculture, construction, transportation, communication, trade, food and so on.

There are various risk investments: aggressive - they are characterized by a high degree of risk, high profit and low liquidity; moderate - sufficient average profit and liquidity to have an average degree of risk; conservative - low risk, low profitability, but high profitability and liquidity (Blank, 2006: 41).

2.1.2 History of the innovation economy and it's replacing into the traditional economy

Innovation has become a widely used term in the 21st century, but it has gone on a very little term. Firms are designed to be innovative for winning and sustaining competitive advantage; consultants declare their strategic advice as to the essence of innovation; survival of local organizations depends on capacity-building through innovation; establishing curriculum system for innovation in schools and universities to introduce themselves as leaders in innovation. Likewise, investors

and finance managers, risk managers also establish capitals on innovation for long-term growth.

At that time, the disappearance of the innovative entrepreneurs in the hands of neoclassical theory contributes to the eradication of the economy of innovation. In the first half of the 20th century, the history of economic thought was pointing to the re-emergence of entrepreneur Joseph Schumpeter as an innovative agent. This is due to the role of an innovative entrepreneur in economic theory and its dynamics central role in explaining business cycles and economic growth.

Innovation economics is defined as the foundation of economic theory, a preliminary economic development, an economic theory that indicates innovation systems are the result of relevant knowledge, innovation and entrepreneurship that operate in the institutional environment. This distinguishes an innovative economy from other sectors of the economy, including the neoclassical theory, which considers capital accumulation as the main engine of economic development, which forms the basis of economic growth.

For the neoclassical economy, science and technology are the forerunners of innovation, while ignoring the role of human management in innovation (Sanidas, 2005, p. 70). Thus, any broad national or global problem arising as a result of economic growth (in particular, emissions of greenhouse gases) is solved due to higher prices (for example, energy) and exogenous achievements of science.

The Innovation Systems (IS) approach is a dynamic view of Richard Nelson's innovation process, which is known as an evolutionary economy in the form of an institutional economy in the original economic work.

Karl Marx starting from the same perspective of innovation as Smith, in his three volumes, thought that in the early years of the industrial revolution he specialized in

the social opportunities of commercial opportunities and the first interest in commercial opportunists were to increase profit opportunities. However, when the industrial revolution began in the 19th century, Marx applied the boundaries of the scale, which led to the inter-sector relations of the manufacturing sector of capital goods.

The stem on the right is the network of institutions of support that evolved to facilitate the marketing of new technologies. This includes the federal laboratories and universities ' technology transfer offices that help scientists and engineers in the six-foot mushroom find uses for their discovery. It includes an increasingly rich mixture of local, state, and nonprofit programs that serve as technology incubators providing a variety of services and supports for start-up firms, including counseling on government grants and business problems.

These private R&D laboratories tend to be located in close proximity to major universities or federal laboratories to facilitate cooperation, and a number of them are employee owned, which is a way to signal their strong commitment to the ethic of scientific discovery: one example is Physical Sciences in Andover, Massachusetts(Fred L. Block, Matthew R. Keller, 2011, State of Innovation: The U.S. Government's Role in Technology Development, p.18)

2.2 The approach by the United Nations- Investment and innovation building and sustainable   development

It is the approach points of view of the issues talked about at this multi-annual expert meeting. Firstly, the article depends on advancements in the bilateral, regional and multilateral investment policy that clarify the buy of the Investment Policy

Framework in the change endeavours identified with the routine of global speculation understandings.

In the 2015 World Investment Report, UNCTAD proposed an activity menu and road map for the change of the worldwide speculation arrangement regime policy.

The investment is fundamental to create productive limits and maintain sustainable improvement. The new age venture approaches, which give comprehensive development and reasonable advancement, have risen based on the speculation pulling in and profiting by these. This urged UNCTAD to refresh its Investment Policy Framework, giving extraordinary consideration regarding how to address speculation strategy challenges at the local and universal dimensions, in light of the direction of part states.

Change of the global speculation understanding routine ought to include four dimensions of policymaking, handle five primary difficulties and pursue six rules. This paper checks out national, two-sided, local and multilateral endeavours to accomplish such change.

2.2.1 National level

Change alternatives at the national dimension incorporate surveys of global speculation understandings and activity plans, coming about, among others, in new model arrangements or one-sided end of settlements. Since 2012, no less than 115 nations have looked into their national or potentially global speculation strategies. Around 100 of them have utilized the Investment Policy Framework. National surveys of global speculation understandings. Near 90 of these nations have concentrated their audits

on the global arrangement measurement, in other words, they have directed worldwide venture understanding surveys. In such audits, nations examine, among

others, their bargain systems and substance profiles and complete effect and hazard appraisals to recognize explicit change needs in accordance with national improvement targets. A portion of these surveys includes parliamentary commitment and contributions from the scholarly world, common society and business. As a major aspect of these surveys,

a few nations choose whether certain global venture understanding connections ought to be renegotiated, changed or ended. Nations that have as of late embraced such surveys are Azerbaijan, Bosnia and Herzegovina, Brazil, Colombia, Egypt, Germany, India, Indonesia, Norway, South Africa, Sri Lanka and Thailand.

Models of global speculation understandings. Sixty nations have created or grown new model global venture understandings since 2012. Until the 1990s, these models were for the most part utilized by created nations; Germany and the United States. Today, both created and creating nations utilize demonstrate contracts. Changed model understandings may likewise exhibit the methodology of another nation to make a worldwide venture approach.

2.2.2 Bilateral level

Two-sided change activities incorporate joint worldwide venture understanding conferences and plans for a joint strategy. They can result in joint elucidations, renegotiations and corrections or consensual terminations of the gatherings' present universal venture understandings, just as the finish of new settlements.

As the "bosses of the bargains", the gatherings to a worldwide venture understanding can and have utilized joint interpretative proclamations on a current arrangement, for instance, as updates of comprehension. Also, a few ongoing worldwide speculation understandings incorporate express arrangements on the intensity of

States to issue joint restricting elucidations on all or a portion of the arrangements of the bargain being referred to.

Arrangement alterations or renegotiations. Since 2012, no less than 19 universal investment understandings, hovering near 50 nations, including the 28 European Union Member States, have been renegotiated or supplanted. Simultaneously, 10 global venture understandings marked before 2012 have gone into power, supplanting prior ones, and 9 universal speculation understandings were marked that have not yet gone into power.

The finish of new, feasible improvement inviting arrangements is a key pathway for the change of global venture understandings. As proposed in the UNCTAD guide for such change, an examination of the pervasiveness of arrangements identifying with worldwide venture understandings elevating the privilege to direct demonstrates an unmistakable move in drafting rehearses. Present day arrangement provisos frequently coordinate the individual approach choices set out in the Investment Policy Framework.

This pattern towards change is significantly increasingly articulated while including "other worldwide speculation understandings" to the investigation. The separate change alternatives are increasingly predominant in as of late finished up "other worldwide speculation understandings", contrasted and respective venture settlements marked amid a similar time outline. The thing that matters is most outstanding as to the illumination of backhanded seizure and the nearness of open strategy special cases.

2.2.3 Regional level

Move made at the local dimension to change the routine of global venture understandings incorporates aggregate arrangement audits and activity plans

identifying with such understandings, which can result in a typical model, joint translations, renegotiations, as well as the solidification of settlements. Territorial, global and mega-regional speculation understandings can likewise propel change of the routine.

A provincial model for global speculation understandings. A local model for such understandings can fundamentally add to a change of the routine by directing various nations as opposed to a solitary one or by affecting a mega-regional understanding. On the off chance that generally utilized, a provincial model can likewise cultivate soundness and diminish the foundational multifaceted nature of the universal venture understanding routine. To the degree that it loans complexity, believability and

influence to a nation's arranging position, a territorial model can be especially valuable for creating nations. Striking instances of early change arranged provincial models for global speculation understandings are those of the Common Market for Eastern and Southern Africa (2007), the East African Community (draft display) and the Southern African Development Community (2012).

The European Union, which is right now arranging various provincial and mega-regional universal speculation understandings, is an extraordinary case worth featuring.

While it doesn't utilize a model understanding essentially, a few reports, whose capacities look like those of a model, control its exchanges. As far as substance, a few European Union approach reports break new ground concerning the change of worldwide speculation understandings and of financial specialist State question settlement.

Nations have progressively occupied with provincial or then again megaregional rulemaking concerning worldwide speculation understandings, and a portion of

these bargains show highlights of universal venture understanding change. To the degree that megaregional understandings combine and streamline the routine of global speculation understandings, they can likewise help oversee connections between universal venture understandings and help improve the foundational consistency of the routine, as proposed in the guide for the change of worldwide venture understandings.

Local Associations. Some provincial associations have work streams containing components of global venture understanding change, and nations inside a locale here and there take activities, for instance, the African Union, the Energy Charter Secretariat and the Southern Observatory.

2.2.4 Multilateral level

The UNCTAD activity menu for the change of global speculation understandings distinguishes a few dimensions of multilateral change that communicate with a move made at other policymaking levels. A worldwide survey of the routine and multilateral agreement expanding on key and rising issues can help build up a common vision on foundational change, bolstered by multilateral backstopping. Business-related to the change of global speculation understandings is likewise done by the United Nations Commission

on International Trade Law, the Working Group on the issue of human rights and transnational partnerships and different business undertakings, and the United Nations Forum on Business and Human Rights, for instance. For quite a long while, UNCTAD has helped nations in the structure of new-age speculation strategies, in other words, global venture understandings that organize comprehensive

development and practical improvement. Following a solicitation from the Conference on International Investment Agreements, held regarding the World Investment Forum in 2014, and dependent on multi-partner inputs, UNCTAD built up the guide for the change of the global speculation understanding routine. It was propelled in the

World Investment Report 2015 and first bantered by part States amid the sixty-second session of the Trade and Development Board. The significance of multilateral counsels on global venture understandings in the quest for the present practical improvement motivation is perceived in the Addis Ababa Action Agenda, which orders UNCTAD to proceed with its interviews with the Member States on such understandings.

2.3 The intensification of UNCTAD specialized help on science, innovation and advancement strategy in creating nations

The commitments of the specialists affirmed a few exercises on science, innovation and development arrangement that UNCTAD has recognized from its work around there. The fundamental ones are laid out underneath. Since the setting of science, innovation and development shift significantly among creating nations, there is no single ideal framework or approach plan for all to pursue. Science, innovation and development approach remains profoundly setting explicit.

In any case, advancement in creating nations has explicit attributes. In these nations, more advancement is found in the conventional parts, as they, by and large, overwhelm these economies. Further, most development is gradual, portrayed by little changes, as opposed to radical, or, expansive scale changes. These economies are regularly described by a huge casual division and little and small scale undertakings by and large prevail. This is critical because little and microenterprises

frequently have a restricted ability to embrace new advances, put vigorously in innovative work, preparing or development, or present major mechanical advancements. Moreover, their profitability and wages are for the most part lower than those of huge firms. The advancement that is gradual and that did not depend on innovative work represents a generally huge offer of the advancement in creating nations.

There is a typical determination in straight reasoning instead of frameworks of inventive reasoning in many creating nations. By and by, this prompts a restricted spotlight by policymakers on logical research, instead of a more extensive spotlight on fundamental shortcomings and the requirement for more extensive strategy objectives.

Still today, it is basic to discover successful institutional structures for the administration of science, innovation and advancement. Shortcomings in institutional administration are normal – insufficient authority, vision and coordination; visit changes in initiative; momentary skylines, which are regularly attached to political cycles; and an absence of continued arrangement support. There is a requirement for abnormal state political help with a particular spotlight on longer-term improvement as opposed to transient expectations and momentary skylines. Feeble linkages in advancement frameworks persevere. In any case, accomplishing coordination crosswise over government services and among Government, industry, examine organizations and colleges is basic improving development execution.

Science, innovation and advancement approach surveys are a piece of a sound procedure including the structure, usage, checking and assessment of such strategy. They have turned out to be valuable in defeating a misconstrued, restricted, direct way to deal with considering and policymaking on development. They have likewise

demonstrated helpful in advancing comprehension of the need to improve the administration of advancement and to fortify linkages crosswise over government services, divisions and organizations, between the general population and private segments, and among research and industry. They have helped, and now and again animated, the beginning of exchange among key players that had not occurred before the survey.

Discovering approaches to address the deficiencies regularly experienced with advancement markers is frequently an issue. A blend of quantitative and subjective methodologies is generally fundamental, with the equalization decided to some extent by the accessibility of solid quantitative measurements.

Preparing and talks on science, innovation and advancement arrangement among creating nation policymakers assume a valuable job in improving the comprehension of policymakers of the plan and execution of such an approach. It can likewise help bolster the mainstreaming of science, innovation and advancement being developed strategy when thankfulness is picked up from the encounters of different nations whose effective strategies and projects can give great practices.

2.4 Norway After Oil

Compared to OPEC countries such as Saudi Arabia, Iran and Iraq, Norway has a rich democratic tradition similar to its neighbours in northern Europe. However, even for a country like Norway, the fact that there is more of natural wealth may prevent it is from becoming a budding country.

Politicians who respond to tackle oil problems are calling newcomers to a new economy. And the efforts to promote a new approach are conducted by an ambitious former business manager, a Royal Norwegian prince and a handful of dissenting

entrepreneurs. According to a report by Rystad Energy, Norway has found that the cost of state oil and gas fields in the past two years has fallen to more than $ 50 billion dollars or nearly one-third. More than 36,000 jobs in the oil sector have disappeared - a significant

figure for the 5.1 million population. Norwegian Innovation and Development Director, Innovation CEO Norway Anita Krohn Traaseth said Norway is time to look beyond oil. "Norway should enhance and build a variety of growth sectors to promote a more diversified and sustainable national economy," he said. In Norway, many industry leaders have emerged, such as Kongsberg Gruppen, but few, the most important points in the country's energy sector. Initially replicating compared to northern neighbours - Iceland, Denmark, Sweden Finland-Norway is in very poor condition. The share of country investments in 2015 lost 8.85% or 30 investments in all 339 investments. In 2015, the total investment amounted to $1.82 billion, while Norway placed the house at $ 85.4 million and finished last. Scandinavian countries are at the top of the list measuring the attractiveness of various regions to establish new regions, while most of the lists do not have Norway. "One of the biggest challenges to local initiatives is in the scarce of private capital for newly established and growing companies," said Karen Elizabeth Om Heschia, growth and growth manager at Nordic Edge Expo. In 2016, the number of investments in Norwegian initiatives rose by 300%, perhaps due to signs that oil and natural gas issues combined with a sense of urgency. Only this year, Norway saw 28 investments in 2015.

The Fund invested a total of 25.3 billion Norwegian kroner (US- $3 billion) on behalf of the government and ministries, and in 2015, 30 per cent of them were undertakings, which distributed 6.1 billion Norwegian crowns (US- $ 729.5 million) to Norwegian businesses.

There are great opportunities for innovative growth in Norway. Profits from the mining sector are available for a green revolution in all sectors. This requires both private and public sectors to improve their games. Nevertheless, Norway is generally known for its low research and development (R & D) costs, and profits from the state's wealth fund are often spent on speculative areas such as real estate. In order to increase business loyalty to financial innovation, the government must realize that the past is an in mission-oriented direct state investment that creates technological and market opportunities that lead to the emergence of the internet, biotechnology and modern green technology sectors. There is a need for national debates on the static issues of the state and the market (and the myths about race productivity ice and competition), mission-oriented public investments and more dynamic questions about how to promote investment-oriented growth with a more determined private sector. the role ... until the oil runs out. The decline in oil prices (a 50% decline since the summer) led to a decline in investments in the oil sector in Norway. Most of the Norwegian industry is based on orders from the oil industry and most are in trouble. One of the 10 jobs in Norway is directly or indirectly related to the oil industry (a total of 239,000 jobs). Two-thirds of Norwegian exports are associated with the oil and gas industry, which makes the Norwegian economy extremely profitable and vulnerable.

2.5 Innovation from R&D aspect in Saudi Arabia

R & D in the developing countries has become world famous multinational enterprises - MNEs like Ericsson, GE, IBM, Intel, Microsoft, Motorola, Nokia, Oracle, Texas Instruments (KHALED S. AL-SULTAN and IYAD T.

ALZAHARNAH, 2012, King Fahd University of Petroleum and Minerals, The Case of Saudi Arabia). These international trends in R & D have begun to present themselves in a national innovation economy that are increasingly integrated into global innovation networks and progressively dependent on foreign sources of information.

Saudi Arabia is not the only country with rich natural resources impact its economy in many ways, including research and development (R & D). Over the past few decades, deep dependence on natural resources has affected the modern Saudi industry. Large companies dominate the sector; Among them are Saudi Aramco, a monopoly in upstream oil production, and Saudi Basic Industries (SABIC), the seventh largest petroleum producer in the world and Middle East's largest non-oil company. Despite potential pockets of innovation, the Kingdom's development is largely in the investment process.

Future innovative platforms in Saudi Arabia cannot be isolated from changes that have long transformed the Saudi economy, known for its chronic dependence on the country's natural resources. This is especially evident when we consider the share of export revenues for the oil sector (see Figure 1).

Figure 1: Annual export revenues of Saudi Arabia
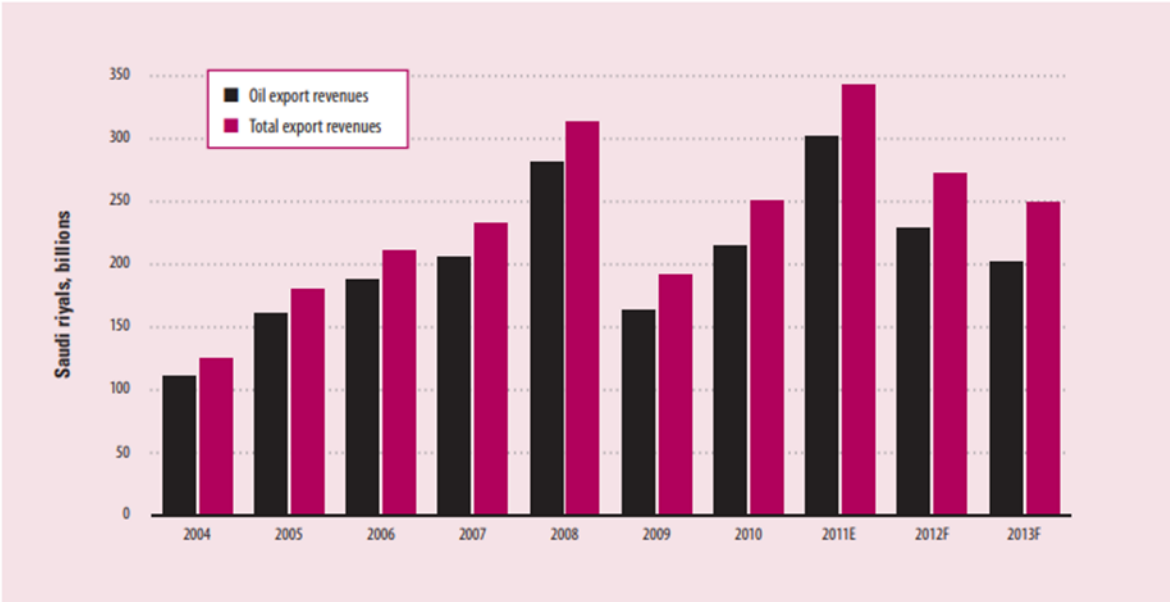
Source: Compiled by the authors from data presented in Jadwa Investment, 2012.

Saudi Arabia appears to be responding dynamically to the global R&D environment transformation, and the cost of R&D has increased significantly. In 2000, Saudi Arabia's budget for R & D and innovation is expected to reach 1% from 2010 to 2015, and reach 2% from 2017 to 2015. Saudi Arabia's economy is part of the changing image of global research and development and is considered one of the emerging economies (and steadily increasing) of its annual investments in R & D infrastructure, education and intellectual property.

2.6 Sustaining Innovation Investment throughout the Gulf states of six Oil-Rich countries: Kuwait, Oman, Saudi Arabia, UAE, Qatar, and Bahrain.

The oil-rich Gulf nations share a typical vision for monetary advancement. Their national improvement plans feature the need to advance and to lessen reliance on the hydrocarbon segment. The formation of all the more good and profitable business open doors for their young and developing populace is an achievement towards freedom and independence and a critical advance in finishing the adolescent's progress to adulthood. A broad and comprehensive writing study on advancement and it's monetarily mind-boggling

connection to enhancement, modernization, industrialization and neediness decrease reliably passes on the phenomenology of development is universal. This finding lines up with the Organization for Economic Co-operation and Development (OECD) recommendation that advancement goes a long ways past the limits of research labs, to clients, providers and buyers all over the place, in government, business and non-benefit associations, crosswise over fringes, crosswise over segments and crosswise over foundations. The development has for some time been contended to be the motor of development and the need to improve has been distinguished by numerous striking creators.

This view is additionally predictable with that of Van der Panne and Van Beers (2006) who ask: "What favours provincial development?" Economies are inseparably connected to the sort of administration and political strategies that states have suffered after some time, with Collier and Hoeffler (2000) expressively tending to these issues as far as avarice and administration. Wilson (2011:5) in his original work, "Is it conceivable to assemble practical development limit in oil-rich Gulf Countries?", displays a sceptical picture and proposes that it is next to no degree as of now for the Gulf States to turn out to be all the more globally aggressive as for advancement and learning basics. To fluctuating degrees, every Gulf State is leaving upon a monetary expansion procedure to move their particular economies from

hydrocarbon reliance. Be that as it may, every Gulf State is seriously compelled in key territories, for example, instructive accomplishment, development, monetary impetus routine, and absence of cognizant science, innovation and development strategy. Wilson (2011) proceeds to include that the fruitful usage of development in the Gulf nations requires due thought.

The basic role of this investigation is to decide the elements related to the advancement in the Gulf. At first, this examination surveyed the factors for approach plan related to development in the six asset rich oil nations of the Gulf and thought about the determinants. Since negative connections between asset plenitude and poor monetary execution have frequently been experimentally settled that offer help for the "asset revile" theory, the way of life of administration, standards and qualities that swarm oil-rich nations become key determinants of their financial achievement. These determinants incorporate wasteful government administration, deficiently taught workforce, poor hard-working attitude in the national work drive, government precariousness and upsets, innovative preparation and market proficiency. Firms' acknowledgement of mechanical developments may basically rely upon the level of these determinants. The inquiry is: for what reason do oil-rich Gulf nations with extraordinary potential increases from development neglect to do as such? The determinants are factually tried and connections are built up.

2.7 Australian case: New approach for growth- the administration needs to put more in Australian innovational development

AFR Innovation Summit raised various difficulties Australia is confronting. These difficulties stayed without arrangements.

Clashing perspectives appeared to run counter to what the long haul view ought to be: the way Australia plans for future success, what we have to do today to guarantee that we will have occupations tomorrow, characterizing a positive job for AI, and supporting development in programming and innovation. What's in question here is an important future for the Australian economy and assorted variety of organizations in adequate numbers that make the best advantage over the longest term. Our aggregate goal appears to be befuddled. The legislature ought to rouse and supporting the venture made each week, by organizations like Digivizer, in item innovative work, showcase advancement, trade improvement and development, with the goal that we create world-class items that make send out riches for Australia. We have put a huge number of dollars in item innovative work — not on elusive trials that meet emotional estimations of verification of some kind of "unadulterated" R&D however on R&D that affirms better approaches to make business esteem. As far as it matters for us, we keep on inquiring about, create, test, apply, learn and emphasize to make something monetarily suitable. Organizations that develop through nonstop improvement, which can isolate what creates income today from the interest in what produces income tomorrow, ought to be praised and boosted — particularly those with track records of taking earlier years' R&D and apply it to future incomes.

We will possibly remain applicable and significant if we keep on dedicating a decent level within recent memory working out what will be vital later on. However, some speakers opined that what organizations like Digitizer do is by one way or another "not genuine R&D". Surely, the administration's arrangement currently appears to be clear: to return investment funds from a foundation program back to the administration, paying little mind to the way that various speakers cited figures appearing low Australia sits in the worldwide development stakes. We should not

overlook that the present R&D support in Australia is for some, a forward expense discount against speculations officially made, including a huge number of long periods of self-evaluation, regularly subject to apparently abstract appraisal, occupying vitality and concentrate far from where it truly checks: real advancement.

It is an extraordinary dissatisfaction that our administration's talk is presently centred around funds as opposed to on speculation for what's to come. As CSIRO CEO Larry Marshall stated, you can't spare your approach to progress. Or on the other hand, as Daniel Petre of AirTree Ventures stated it: "The legislature shouldn't f—up to the R&D charge impetus — it's basic for new companies and basic than for organizers to hold value." In the interim, nations, for example, Sweden, Israel and Germany redeploy up to 100% of the funds from prior R&D plans into direct R&D stipends.

Australia risks being a development backwater. Figures from the meeting refer to a drop in Australia's gross R&D use as a level of GDP from about 2.25% to about 1.9% somewhere in the range of 2007 and 2015. The OECD's figures developed from about 2.3% to almost 2.4%. The World Intellectual Property Organization puts Australia at seventeenth in our area, behind Hong Kong, Singapore and South Korea.

For a country with only 0.33% of the total populace, we have to improve at going worldwide. The administration needs to make conviction, clearness and consistency with an emphasis on future worldwide importance, and afterwards, do everything it can to enable organizations to prosper. By all methods request thoroughness, however, don't befuddle compelling organizations to hop through an interminable parade of circles with advancement.

2.8 SMEs on outsource hindrances, activities in European Union

As a significant barrier to exports, many SMEs reported limited access to finance. There are two facets to this concern: limited commercial finance availability and

limited access to sufficient working capital for business operations. Trade finance, which is an essential component of export transactions, ensures that exporters receive payment for their goods shipped overseas. By contrast, access to sufficient working capital is essential for conducting daily operations and expanding into new business areas such as exporting. The ability to finance sales to foreign suppliers that have access to government-provided financing.

While the need for working capital is not directly linked to exports, it remains one of the biggest concerns for SMEs. It is also unlikely that companies that are unable to finance daily operations or domestic growth will expand their exports. There have been press reports of manufacturing SMEs forced to close because of shortfalls in working capital due to late receipt of payment for receivables.15 In the case of the service sector, many SMEs are young companies that are not able to qualify for bank financing because they cannot provide three years of financial records. In addition, the nature of service sector firms is such that they do not have factory-like assets to serve as collateral.

The foreign barriers most frequently cited by SMEs were foreign government regulations, especially labeling rules and regulations on health and phytosanitary (SPS); language and cultural barriers; and the United States. Limited knowledge of foreign markets for SMEs. According to one global company that works closely with SMEs, another problem for SMEs are trade barriers that prevent large U.S. service providers from operating in foreign markets, particularly providers of financial, insurance, and logistics services. The company representative explained that many SMEs likely prefer to use the same service providers in foreign markets that they use at home, facilitating small companies' abilities.

2.9 Case study: Investigation from Lithuania

With this thesis, I would like to depict my online investigations and probes which I attended an international conference in Lithuania (for mobility in the topic of entrepreneurship, innovation, social business, a new approach of economy in Schengen countries) for new aspects of economic growth in the world economy.

But in some cases, there are a wide range of problems to invest in traditional economy which is encouraged to invest in innovation economy. They are the following:

- ✓ Oil price fluctuations
- ✓ Foreign exchange gaps

The price of oil can fluctuate which is hampering investments and financial stocks, ruining projects and ventures in these sectors. The foreign exchange gap while trading oil also affects the economy as a major issue. From the sustainable developing aspect, these reasons are a barrier to innovational development.

Looking at Lithuanian cases for improving innovation economy they intensification education, knowledge, technology, entrepreneurship.

During visiting Free Economic Zone, I determined their territory: production and logistics, business street, airpark, aircraft taxiways, 330/110 kV district electrical substation, railway and of course occupied territories by investors.

It is prudent that for investors one of the main factors also is tax and taxation. It is an undeniable fact there are tax incentives in the Free Economic zone in Lithuania. Investors in logistics or manufacturing of at least 1 million EUR or service at least 100 thousand EUR benefit from exemption corporate tax:

- ✓ 100% exemption during the first 10 years

✓ 50% exemption for following 6 years

Inland plots with complete infrastructure, settlement duration and stages are the following:

✓ The agreement is 2-4 weeks
✓ The technical project, preparation of required paperwork is 4-6 months
✓ The construction process is 8-12 months

In addition, there is no real estate taxes are paid in Free Economic Zone territory. And no taxes on dividends earned by foreign investors (pursuant to the Law on Corporate Income Tax)

After investing in innovational aspects, the qualified labour force in Kaunas region is as follows.

The tables illustrate the proportion of people assessing aspects of one city's life with 293.800people in the labour pool.

Overall, education is given the highest scores in both 2018 and 2019 years. Meanwhile, education's rating rose over the period with 54.335 students:

➢ 32.853 students from seven universities
➢ 12.582 students from eighteen vocational schools
➢ 10.595 students from eight colleges

In 2018, people rated knowing the language the highest, with over 92% approving of speaking at least one foreign language, while the other one had a figure of 50%. Under 50% of Lithuanian respondents thought they speak two foreign languages.

As for the labour force from 293.800 people, the proportion with 19%, works in manufacturing and on average they earn 800 EUR average gross salary.

With regards to the pie chart which is given at the end, in an appendix (number blab la) illustrates the proportion of six types of educational programmes in Lithuania in 2018 and 2019.

It is useful to incorporate details such as revenue breakdowns by product line or region in planning for an established business. Fine-grained comparisons between predictions and results can help with problem solving and isolation. But for a strategic experiment, such detail is unrealistic. The unknown is too big. Moreover, the lessons are not in the details, but in a handful of critical unknowns that can make a business or break it.

Most critical technology unknown: Could MEMS be manufactured at levels of reliability sufficient for an automotive-safety application?(Thomas H. Davenport, Marius Leibold, Sven C. , Strategic Management in the Innovation Economy, p. 149)

3.1 Data and Methodology

Quarterly data for the period of 2007-2018 is used in the paper. The main disadvantage of using annual data in VAR model is that it concludes for the longer period of a year due to lags. However, it is avoided using quarterly data and that makes quarterly data much useful in the VAR models. The following factors have been chosen to be included in the paper: goods exports, real effective exchange rate, the share of information and communication in GDP, FDI, crude oil prices. The data on exports are from Azerbaijan State Statistical Office. Real effective exchange rate, the share of information and communication in GDP and FDI are obtained from the Central Bank of Azerbaijan. Since Azerbaijan has had fixed exchange rate for most of the years of the period studied, the real effective exchange rate is included in the model. In this way, it will be much easier to analyze the investment challenges of innovation economy in Azerbaijan and the transmission channel from the investment

to the GDP in the country. Oil prices variable is denoted as U.S. dollar per barrel for the determined period of time.

In order to investigate the effect of the investment to the GDP and to see how the transmission channel processes from investment to the GDP in Azerbaijan, the study proposes Vector Autore-gressive (VAR) model. It is useful to implement the VAR model to predict the time series data set and also to investigate the shock's dynamic impact in one variable to the other. Widarjono (2007: 371) says the time series model is a fundamental model related to economic theory that is widespread. Sometimes the current economic theory can not ascertain the sufficient model. It's prevalent for the theory to be too complicated and nuanced to build the simplification or the data set to be very complex if we only use the existing theory. In order to solve the problems of traditional simultaneous structural models and single equation models, Sims (1980) built the Vector Autoregressive (VAR). He established a VAR model to mitigate the time series model's theory methodology. He wanted to embrace the whole economic phenomenon throughout the model with this VAR. In addition, with the VAR that Sims (1980) upholds, the set of variables is handled in equal treatment. In VAR, we do not distinguish between endogenous variables and exogenous variables. It is presumed that all variables are interrelated in the model.

VAR is useful to evaluate this fieldwork on the scale of the VAR proposed by Sims (1980), since the paper scrutinizes the interrelationship among these research exports, exchange rate, information and communication, investment and oil prices. We need to estimate the number of delays to show the relationship between variables. This number of lags is used to detect the effect of these variables from the other variables in the system.

Standart n-equation VAR model based on Enders (2004: 312-313):

$$
\begin{bmatrix} x_{1t} \\ x_{2t} \\ \cdot \\ x_{nt} \end{bmatrix} = \begin{bmatrix} A_{10} \\ A_{20} \\ \cdot \\ A_{n0} \end{bmatrix} + \begin{bmatrix} A_{11}(L) & A_{12}(L) & \cdot & A_{1n}(L) \\ A_{21}(L) & A_{22}(L) & \cdot & A_{2n}(L) \\ & \cdot & \cdot & \cdot & \cdot \\ A_{n1}(L) & A_{n2}(L) & \cdot & A_{nn}(L) \end{bmatrix} \begin{bmatrix} x_{1t-1} \\ x_{2t-1} \\ \cdot \\ x_{nt-1} \end{bmatrix} + \begin{bmatrix} e_{1t} \\ e_{2t} \\ \cdot \\ e_{nt} \end{bmatrix}
$$

Where: x_{it} are the variables employed in the VAR, i

A_{i0} are the intercept terms

$A_{ij}(L)$ are the lag operator polynomials operator

e_{it} are white-noise disturbances that may be correlated.

The n-equation VAR derived from Enders (2004), can also be written as follows:

$$
x_t = A_0 + \sum_{1}^{n} A_i x_{t-i} + e_t
$$

Where: x_t is an (n x 1) vector containing each of the n variables employed in the VAR,

A_0 is an (n x 1) vector of intercept terms

A_i are (n x n) matrices of coefficients

e_{it} is an (n x 1) vector of error terms

The observation matrices are x_t = [Azerbaijan`s goods exports, real effective exchange rate, the share of information and communication in GDP, FDI, crude oil prices].

3.2 Identification and restriction

According to Enders (2004: 302), when the total amount of parameters in the primitive system is dissimilar, the recognition problem arises. This results in the rudimentary system being under-identified or over-identified. To get the exactly

identified system, it is necessary to impose limits to mitigate the problem of detection. VAR process:
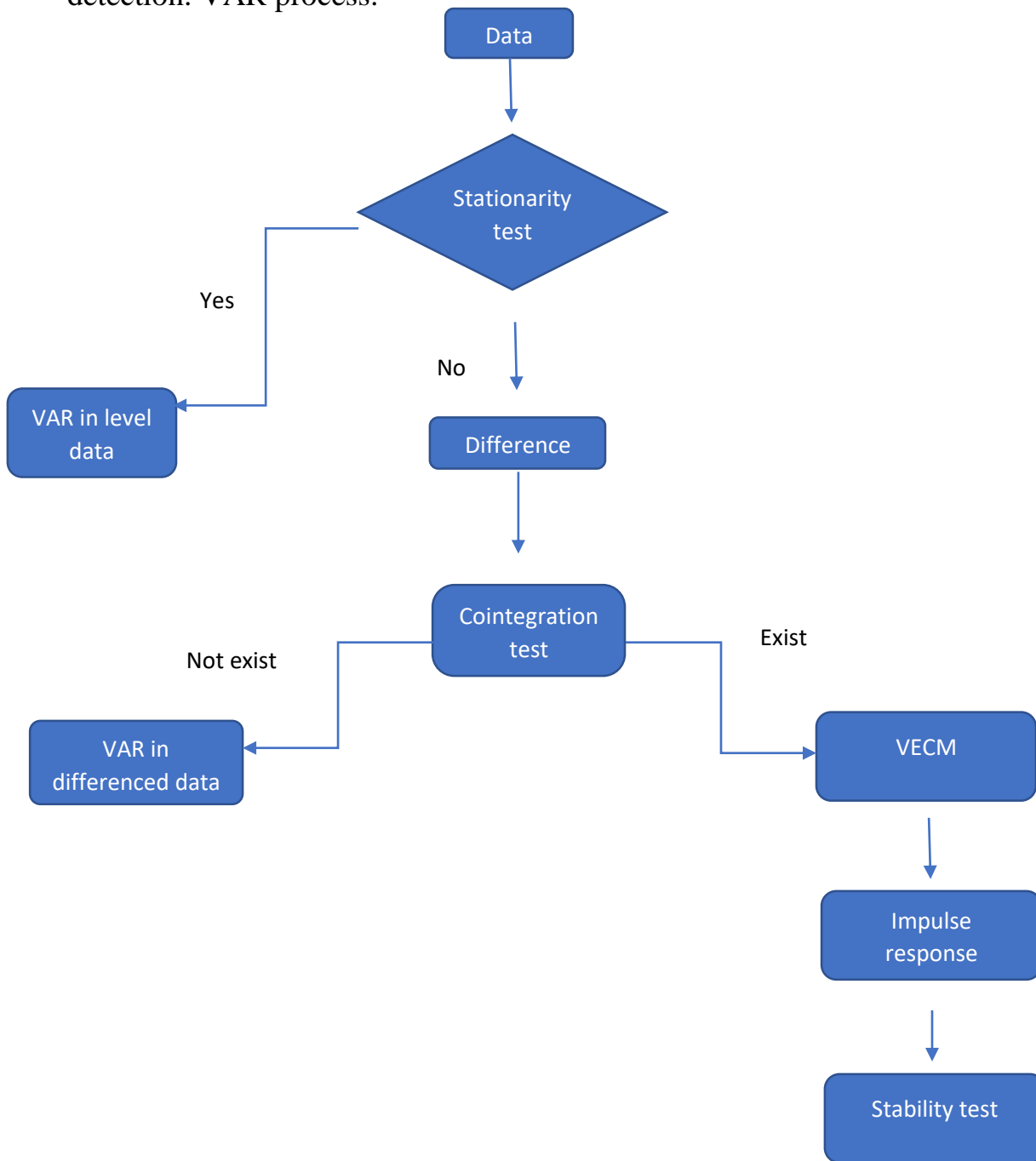

Figure 2. VAR process

Figure 2 illustrates the VAR system process. First of all, the set of data in the stationary test should be scanned. If the level of the data is stationary, we will have VAR at level or commonly known as VAR unrestricted. From the other hand, we used the data in differentiation if the data is not stationary in level. If we have stationary data differently, we should go through the next step to investigate the cointegration to see if there is cointegration among variables or not. Whether the outcome of the cointegration test demonstrates that the variables are cointegrated, then VECM (Vector Error Correction Model) must be used. If cointegration does not occur, we will apply VAR in level. In addition, ascertain the adequate lag to be included in the model before measuring the VAR / VECM model. If the model is adequately lagged, then try to calculate the VAR / VECM model. In addition, the Impulse Response Function should be scrutinized before performing the model's flexibility with the stability test.

3.3 Unit root test

Data from the time series is often not stationary, thus causing a spurious regression. Spurious regression occurs when the regression result depicts a statistically significant coefficient, but there is no correlation between variables in the model (Widarjono, 2007: 339). If there is a tendency that the mean and variance are not constant, non-stationary data can be said to be stationary. We need to perform some tests to check the stationary off the variables. There are a lot of tests to check the variables stationary. Non-formal testing and formal testing exist. Observing the variable stationary from the graph is a non-formal test on the other hand, by conducting the Augmented Dickey Fuller (ADF) test, we can also perform formal testing. In this paper, we will conduct an ADF test to investigate the stationary of the variables.

This paper examines five variables: exports, exchange rate, information and communication, FDI and oil prices. Based on standard model specification ADF, the it is possible to write the following equation:

$$\Delta Exports_t = \beta_1 + \beta_2 t + \delta Exports_{t-1} + a_i \sum_1^m \Delta Exports_{t-i} + \varepsilon_t$$

$$\Delta \text{Exrate}_t = \beta_1 + \beta_2 t + \delta \text{Exrate}_{t-1} + a_i \sum_1^m \Delta \text{Exrate}_{t-i} + \varepsilon_t$$

$$\Delta \text{Infotech}_t = \beta_1 + \beta_2 t + \delta \text{Infotech}_{t-1} + a_i \sum_1^m \Delta \text{Infotech}_{t-i} + \varepsilon_t$$

$$\Delta \text{FDI}_t = \beta_1 + \beta_2 t + \delta \text{FDI}_{t-1} + a_i \sum_1^m \Delta \text{FDI}_{t-i} + \varepsilon_t$$

$$\Delta \text{Oil price}_t = \beta_1 + \beta_2 t + \delta \text{Oil price}_{t-1} + a_i \sum_1^m \Delta \text{Oil price}_{t-i} + \varepsilon_t$$

Equations above show the model specification for ADF test for exports, exchange rate, information and communication, FDI and oil prices.

3.4 Cointegration test

If the level variable is non-stationary, differentiated data will be used first. Even though the variable has been differentiated, variable may result in the possibility of the long-term relationship between variables being present. We use the cointegration test to check whether the variables have a long-term relationship with the other variables. If a differentiated variable is cointegrated, VECM should be applied. On

the other hand, the model will be VAR in difference if the result of the cointegration test reveals that there is no cointegration in differentiated data.

We must specify the correct lag to be included in the cointegration test before conducting the cointegration test. There are many methods to ascertain the lag-order selection, such as the final prediction error (FPE), the information criterion of Akaike (AIC), the Bayesian information criterion of Schwarz (SBIC), and the information criterion of Hannan and Quinn (HQIC). We operate the quiz that encapsulates those methods and also manages to capture lag order selection statistics for a series of order 1 VARs and a sequence of probability-ratio test statistics for all order complete VARs of less or equal to the greatest lag order. The value of the final prediction error (FPE), the information criterion of Akaike (AIC), Schwarz's and the information criterion of Hannan and Quinn (HQIC) lag selection statistics should be checked from the result in order to obtain the appropriate lag to be included. The fitted lag is the lag that most of the criterion indicates.

Then continue the cointegration test after we get the fitted lag. A method for testing cointegration was proposed by Johansen (1988) and Johanson-Juselius (1990). Trace testing is based on the statistics of Trace and Maximum Eigenvalue. Both tests compare the statistics of Trace or Maximum Eigenvalue with their critical value of 5 percent. The purpose of the Johansen test is to know how much of the model's cointegration vector. If cointegration does not exist, it implies that there is no long-term relationship between variables. To check the cointegration, the result of the cointegration test must be checked. The table contains the rank, the value of its own, the statistical trace and the critical value. The null assumption is the number of relationships cointegrating is equal to r given in the output column of the "maximum rank." The alternative is that relationships are more than just co-integrating. If the statistics of the trace are greater than the critical value, the null is rejected.Start by

testing H0: r = 0. Repeat for if it rejects H0: r = 1. Stop testing there if a test is not rejected, and that value of r is the common estimate of the number of cointegrating relationships. If there is cointegration exist in the Johansen test, it means that there is long run relationship between variable, and we propose the VECM (Vector Error Correction Model), otherwise we use VAR in difference.

3.5 Vector Error Correction Model (VECM)

As discussed above, we built the VECM model if there are co-integrated variables in the differentiated variables. VECM is one of the autoregressive vector model with data on cointegration. VECM's standard model is as follows:

$$\Delta x_t = \pi x_{t-1} + \sum_{1}^{p} \pi_i \Delta x_{t-i} + \varepsilon_t$$

In the first differences, we can call the equation a traditional VAR if all elements of π are equal to zero. Three important structures are obtained in the VECM model. First, we obtain the short-run coefficient matrices that include the short-run adjustment parameters of each variable with itself and at its own lag time with the other variables. Second, we get the long-term matrix of cointegration that presents the relationship of long-run equilibrium between variables in xt. In addition, we also obtain the velocity matrix of the adjustment terms which is an error correction if there is a deviation to the long-term equilibrium will be gradually corrected by adjusting short-run.

3.6 Impulse Response Function (IRF)

As it is very difficult to interpret the coefficients of each of the VAR models, we use the analysis of the Impulse Response Function. Impulse Response Analysis of the

function of the VAR model is an important one. Impulse Response Function Analysis traces the endogenous variables response in the VAR system due to shocks or error term changes (Widarjono 2007: 380).

3.7 Stability Test

We have to perform stability checks to check if our model is stable or not. If the models of the maintaining r eigenvalues are lower than one, the model can be said as a stable model. The result shows the plotted value of its own in the circle. If the individual value is inside the circle, our model is well-specified.

4. Empirical research results

The chapter includes the analysis of the relationship between the investments and innovation economy in Azerbaijan based on the methodology.

4.1.1 Stationarity test

Since, the VAR approach is used, the process starts with the application unit root test. Whole variables' unit root is checked through ADF test including intercept in test equation. In the below table, test's results are given in level data. As shown on the table, only Infotech variable is significant at 5% and 10% significance levels of the ADF test. Unlikely to the Infotech variable, other variables show insignificant test results in all critical values failing null hypothesis's rejecting of the unit root for these variables. Since there is a unit root, Exports, FDI, the prices of oil and exchange gap rate variables are not stationary in level.

ADF test in level.

Variable	ADF test	Critical value			Result
		1%	5%	10%	
Exports	-2.115034	-3.584743	-2.928142	-2.602225	Unit root
FDI	-1.817473	-3.600987	-2.935001	-2.605836	Unit root
Infotech**	-3.512962	-3.584743	-2.928142	-2.602225	No unit root
Oil prices	-2.069278	-3.584743	-2.928142	-2.602225	Unit root
REER	-1.618273	-3.584743	-2.928142	-2.602225	Unit root

In order to know whether the non-stationary data are stationary in its first differenced form, there is a need for the further test in differenced variables. Table below shows the result of ADF test in first differenced variables. As a result of the test, all variables are statistically significant null hypothesis's rejection for unit root. REER by 1st difference is the only variable having a weak stationary in 10% significance level only, while other variables in their first difference forms are strongly stationary even in 1% significance level of ADF test.

Variable	ADF test	Critical value			Result
		1%	5%	10%	
D(Exports)	-5.815539***	-3.588509	-2.929734	-2.603064	No unit root
D(FDI)	-10.28141***	-3.588509	-2.929734	-2.603064	No unit root
D(Oil prices)	-5.774456***	-3.588509	-2.929734	-2.603064	No unit root
D(REER)	-2.790885*	-3.596616	-2.933158	-2.604867	No unit root

4.1.2 Determine lag order selection

The outcomes of the selection criteria for the lag order for VAR (Appendix), the final prediction error (FPE), AIC and HQ determines the optimal number of lag to be 5. Other criteria rather than those also have close values at this lag to their lowest.

4.1.3 Cointegration test

As a result of the cointegration test, the supposition is that there is one cointegration vector. The table below includes the ranks, eigenvalues, trace statistics and critical values. The test's null hypothesis: the number of vectors that cointegrate: the number of cointegrating vectors equals to r (given in the "Hypothesized No. of CE(s)" column of the output in the table below). The alternative hypothesis is that more than r cointegrating relationships exist. If the trace statistic is greater than the critical value, the null is rejected. Start with the H0 test: $r = 0$. Repeat for H0 if it refuses: $r = 1$. Stop testing there if a test is not rejected, and that value of r is the common estimate of the number of cointegrating relationships. In our case, $H0 : r = 0$ is rejected at a level of 5% ($95.29041 > 69.81889$). Then we continue to the $r = 1$. When $r = 1$, the trace statistic is less than its critical value ($45.84106 < 47.85613$) and we stop Rejecting the null hypothesis which means we can conclude that there are one cointegration vectors in the model. The existence of cointegration vector (one cointegration in our model) explain that the variables have a long-term relationship and we should continue to use VECM (Vector Error Correction Model).

4.1.4 Johansan cointegration test:

Date: 05/05/19   Time: 23:53

44

Sample (adjusted): 2008Q4 2018Q2

Included observations: 39 after adjustments

Trend assumption: Linear deterministic trend

Series: DIFF_EXPORTS DIFF_FDI DIFF_OILPRICES DIFF_REER INFOTECH

Lags interval (in first differences): 1 to 5

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.718587	95.29041	69.81889	0.0001
At most 1	0.418240	45.84106	47.85613	0.0764
At most 2	0.258632	24.71485	29.79707	0.1719
At most 3	0.216066	13.04380	15.49471	0.1132
At most 4	0.087006	3.550026	3.841466	0.0595

Trace test shows 1 cointegrating eqn(s) at 0.05 level * denotes rejection of the 0.05 level * *

| MacKinnon-Haug-Michelis (1999) | p-value |
| hypothesis | |

Cointegration approach is recognized with its error correction indicator in the analysis that determines the short run adjustment in the model if there is any deviation in long run equilibrium (Widarjono 2007: 375).

As the existence of the cointegration is approved, VEC model may be built. The model estimates the parameters of cointegrating vectors. These are the short-run coefficients and long-run cointegrating equations.

4..1.5 VECM estimation

Since the study is to analyze the investments in innovative economy, the transmission channel showing the analysis based on economic model should be reviewed first. Through the transmission channel and based on the economic situation in the country, FDI increase in the economy is expected to cause to high share of information and technology in GDP in the country.

The fact is that the country strategy, especially in recent years tends to be transfer into the diversified economy and important measures are taken in order to avoid the oil dependency of the economy. Thus, an increase in the FDI which is the foreign direct investment will tend to rise the non-oil fields of the economy. Alongside the agriculture, service and other non-oil fields, information and communication field is also one of the potentially faster growing fields of the economy. Information and communication sharing in GDP is taken as a proxy variable of the innovative economy. The more is the Information and communication sharing in GDP, the more innovative is the economy.

4.1.6 Short run analysis

The VECM estimation starts with the short-run analysis first. As the 5 variables are included in the model, 5 short-run equation are present under the model too. Out of them, the ones with dependent variables of the share of information and communication and FDI are chosen to be studied. It is because the paper aims to analyze their relationship among the FDI and Infotech variables. Chosen equations are estimated separately using OLS method in order to analyze the short-run lagged coefficients variables on the dependent variables.

The below equation is the cointegration equation that defines the speed of the conditions for adjustment terms. The error correction term in this case is the short-run adjustment speed of the long-run equilibrium.

1. CointEQ1 = DIFF_EXPORTS(-1) + 0.328693*DIFF_FDI(-1) - 60.67295*DIFF_OILPRICES(-1) - 17.48798*DIFF_REER(-1) - 253.1556*INFOTECH(-1) + 484.3413

The effects of short-term of the included independent variables shown with their lags in the equation have been tested via the Wald test. Considering that the quarterly data is used for the paper and one lag is one quarter, then analysis of 4 lags together may be considered as a short-run analysis as well.

Short-run VECM equations with the dependent variables of FDI and Infotech are shown in the table below. While conducting the analysis, the significance of the joint effects of the lagged coefficients of each including variable have been tested in each equation via the Wald test. From the first equation, it may be seen that the lags of exports, FDI, oil price and REER have statistically significant short-term relationships with FDI variable, while only infotech variable has not any significant relationship with the FDI. In the meantime, the second equation states that there is

no any significant relationship between the infotech variable and other variables included in the equation.

Short-run analysis.

Variables:	**Exports**	**FDI**	**Oil prices**	**REER**	**Infotech**
1st equation (dependent variable is FDI)					
Wald test (p-value)	0.0675*	0.0000***	0.0598*	0.0039***	0.1922
2nd equation (dependent variable is Infotech)					
Wald test (p-value)	0.9557	0.9790	0.6473	0.9807	0.2454

*** - significant at 1% significance level;

** - significant at 5% significance level;

* - significant at 10% significance level.

The signs of the each coefficient you can see in the table put in the Appendix of the paper where Eviews analysis for the short-run analysis of two mentioned equations has been conducted.

The mentioned short-run analysis above concludes that there is no statistically significant short-term relationship between FDI and infotech variables. Mostly because of the higher proportion of oil and gas fields in the GDP throughout the

period. Even though information and communication production increased annually from 475.7 mln. AZN to 1242.8 mln. AZN, its share in the GDP is stable throughout the studied period, since the country GDP increased at the similar rate. During the period, FDI is mostly dominated by oil and gas field, while recently non-oil fields attracts the FDI in the country due to the significant changes in the country strategy. Besides, considering that the REER is mostly explained by the oil prices in the country, a strong statistically significant relationship between the FDI and REER in the first equation is also dependent on oil prices. These all gives the conclusion that there is no short-run relationship between the investments and innovative economy in Azerbaijan.

4.1.7 Long Run Anaysis

The cointegration equations are used to analyze the long-run relationship in the VECM model. While analyzing, the order of the variables should be based on the analysis of the economic model. The aim is to analyze the long-term relationship between Infotech and FDI, thus the order of variables put in the model is as follows: Infotech, Exports, FDI, Oil Prices, REER.

In this paragraph, we set the order of restrictions see the effects of Exports, FDI, Oil prices and REER to the Infotech in a long run. Since there are one cointegration vector, the Johansen test automatically restricts one restriction in cointegration equation.

Johansen normalization restrictions imposed

Cointegrating Eq:	CointEq1

INFOTECH(-1)	1.000000
DIFF_EXPORTS(-1)	-0.003950
	(0.00060)
	[-6.54120]
DIFF_FDI(-1)	-0.001298
	(0.00064)
	[-2.03816]
DIFF_OILPRICES(-1)	0.239667
	(0.04127)
	[5.80719]
DIFF_REER(-1)	0.069080
	(0.01725)
	[4.00443]
C	-1.913216

Another rule used while analyzing the long-run relationship via the cointegration equations is that the number of coefficients cointegration equations in short-run

equations should be negative and statistically significant. It is because they are error corrections for the long run relationship.

Analysis shows that coefficient of cointegration equation 1 in both short-run equations in the table in Appendix has positive and statistically negligible value. So it states that there is not a long-run causality running from Exports, FDI, Oil prices and   REER   to   Infotech.

4.1.8 Post Estimation

The stability of the system VEC Model is tested as the post estimation step of the modelling. The test result verifies whether the number of equations that co-integrate in the system are correctly specified. If the moduli of r eigenvalue are lower than one, then the number of cointegration equations are correctly specified.

Graph. 1

Inverse Roots of AR Characteristic Polynomial
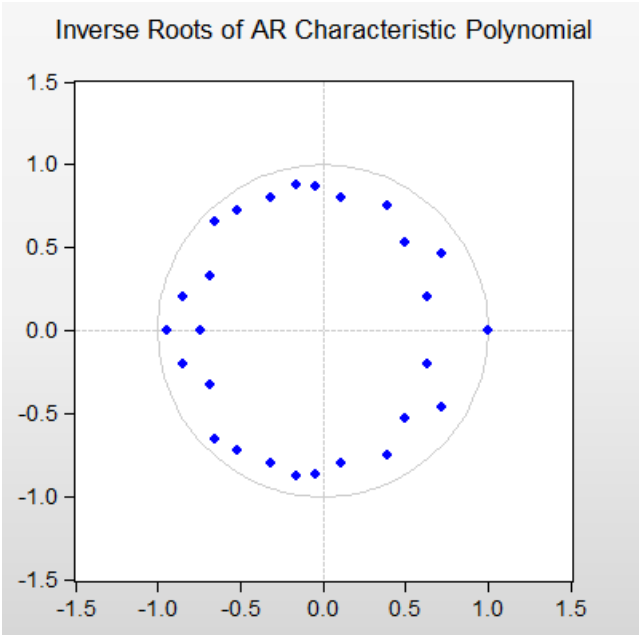
It is clearly seen from the graph above that the eigenvalues exist inside the circle. No eigenvalues is outside the circle. We can conclude from the stability check that our model is stable or well-specified.

Impulse Response Function

Graph 2. Response to Cholesky One S.D. Innovations
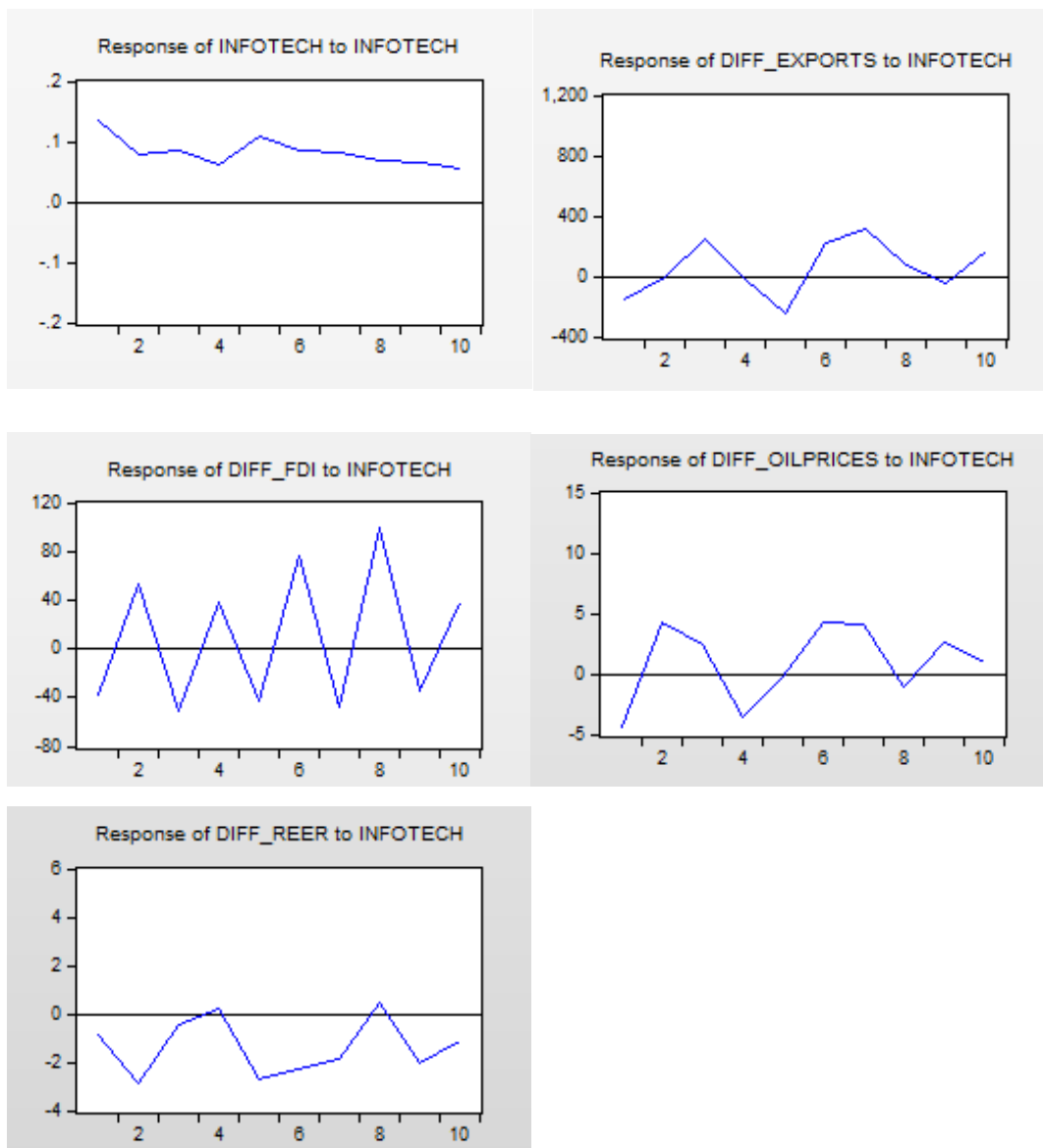
The impulse response helps the author to see the respond of the model over time to the shocks applied to one of the variables. In this case, the response is analyzed over the period of 39 quarters. The shocks are applied to the model through the Infotech to see the responses of other variables to given shocks.

It can be seen that in the case of a shock to the Infotech variable, the FDI variable reveals itself to have a long-term memory while the exports, oil prices and REER variables tend towards equilibrium more quickly.

CONCLUSION

The study has used the VECM methodology to investigate the impact of investment to innovative economy in Azerbaijan. The short run result shows that in a short-run FDI and Infotech variables have insignificant statistical relationship. However, the reasons of incompatible result has been explained in details that it is mostly due to the higher share of oil and gas field in the GDP throughout the period. Another contributing finding is that there is a strong statistically significant relationship between the FDI and REER in the first equation. These findings lead to the conclusion that there not a short-run significant transmission channel from the investment to the innovative economy, given the quarterly data for the period of 2007-2018.

Long-run analysis also has been conducted for the model and it is found that there is not a long-run relationship running from Exports, FDI, Oil prices and REER to Infotech either. Besides, with the help of impulse response functions it can be seen how the model responds over time to Infotech shocks applied to the model variables. the exports, oil prices and REER variables tend towards equilibrium more quickly while the FDI variable reveals itself to have a long-term memory.

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APPENDIXES

VAR Criteria for selection of orders

Endogenous variables: DIFF_EXPORTS DIFF_FDI DIFF_OILPRICES DIFF_REER INFOTECH

Exogenous variables: C

Date: 05/05/19 Time: 23:39

Sample: 2007Q1 2018Q2

Included observations: 40

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-860.0372	NA	4.19e+12	43.25186	43.46297	43.32819
1	-811.6101	82.32607	1.31e+12	42.08051	43.34717*	42.53849
2	-768.8021	62.07168*	5.73e+11	41.19010	43.51231	42.02974
3	-740.1548	34.37675	5.62e+11	41.00774	44.38550	42.22903
4	-700.9877	37.20871	3.91e+11	40.29939	44.73269	41.90233
5	**-661.8487**	**27.39734**	**3.77e+11***	**39.59243***	**45.08129**	**41.57703***

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Short-run equations:

1st equation: D(DIFF_FDI) = 54.4474556884*(INFOTECH(-1) - 0.00395013907624*DIFF_EXPORTS(-1) - 0.00129838196375*DIFF_FDI(-1) + 0.239666609971*DIFF_OILPRICES(-1) + 0.0690799350804*DIFF_REER(-1) - 1.91321568647) + 0.153476960149*D(DIFF_EXPORTS(-1)) + 0.0852570999347*D(DIFF_EXPORTS(-2)) - 0.141096289412*D(DIFF_EXPORTS(-3)) - 0.131424745723*D(DIFF_EXPORTS(-4)) + 0.00445190730566*D(DIFF_EXPORTS(-5)) - 0.871524631602*D(DIFF_FDI(-1)) - 0.0597947854444*D(DIFF_FDI(-2)) + 0.350677117824*D(DIFF_FDI(-3)) - 0.271760218155*D(DIFF_FDI(-4)) - 0.412145825217*D(DIFF_FDI(-5)) - 9.25915904661*D(DIFF_OILPRICES(-1)) - 1.92406752905*D(DIFF_OILPRICES(-2)) + 12.6219065229*D(DIFF_OILPRICES(-3)) + 18.7042931751*D(DIFF_OILPRICES(-4)) + 4.35801449192*D(DIFF_OILPRICES(-5)) - 7.8914849985*D(DIFF_REER(-1)) - 12.6747392148*D(DIFF_REER(-2)) - 6.15474741795*D(DIFF_REER(-3)) + 10.5453954994*D(DIFF_REER(-4)) + 2.22165287471*D(DIFF_REER(-5)) + 375.811556637*D(INFOTECH(-1)) - 122.476677967*D(INFOTECH(-2)) - 26.0424339172*D(INFOTECH(-3)) - 263.665683504*D(INFOTECH(-4)) + 363.528039171*D(INFOTECH(-5)) - 5.32521070895

Observations: 39

R-squared	0.959193	Mean dependent var	4.358974
Adjusted R-squared	0.870778	S.D. dependent var	337.4115
S.E. of regression	121.2908	Sum squared resid	176537.5
Durbin-Watson stat	1.928774		

2nd equation: D(INFOTECH) = 0.0586514192147*(INFOTECH(-1) - 0.00395013907624*DIFF_EXPORTS(-1) - 0.00129838196375*DIFF_FDI(-1) + 0.239666609971*DIFF_OILPRICES(-1) + 0.0690799350804*DIFF_REER(-1) - 1.91321568647) -

0.506513921602*D(INFOTECH(-1)) + 0.000253550581027*D(DIFF_EXPORTS(-1)) + 0.000256261306079*D(DIFF_EXPORTS(-2)) + 0.000208207630993*D(DIFF_EXPORTS(-3)) + 0.000136564272614*D(DIFF_EXPORTS(-4)) + 5.05530883961e-05*D(DIFF_EXPORTS(-5)) + 0.000192824666525*D(DIFF_FDI(-1)) + 0.000282888624684*D(DIFF_FDI(-2)) + 0.000234686357351*D(DIFF_FDI(-3)) + 3.96835031266e-05*D(DIFF_FDI(-4)) - 1.35365528217e-05*D(DIFF_FDI(-5)) - 0.0180008679711*D(DIFF_OILPRICES(-1)) - 0.0235326094419*D(DIFF_OILPRICES(-2)) - 0.0242593254132*D(DIFF_OILPRICES(-3)) - 0.0193895262644*D(DIFF_OILPRICES(-4)) - 0.00995674859091*D(DIFF_OILPRICES(-5)) + 0.00196073248798*D(DIFF_REER(-1)) + 0.00511471394168*D(DIFF_REER(-2)) + 0.00360065817952*D(DIFF_REER(-3)) + 0.0022775327348*D(DIFF_REER(-4)) - 0.00483363769132*D(DIFF_REER(-5)) - 0.506513921602*D(INFOTECH(-1)) - 0.119858241425*D(INFOTECH(-2)) - 0.040603192739*D(INFOTECH(-3)) + 0.227934360464*D(INFOTECH(-4)) + 0.175893048661*D(INFOTECH(-5)) + 0.000683887109954

Observations: 39

R-squared	0.755599	Mean dependent var	-0.001430
Adjusted R-squared	0.226063	S.D. dependent var	0.154774
S.E. of regression	0.136160	Sum squared resid	0.222475
Durbin-Watson stat	2.055487		

The signs of the short-run coefficients

System: UNTITLED

Estimation Method: Least Squares

Date: 05/06/19   Time: 01:15

Sample: 2008Q4 2018Q2

Included observations: 39

Total system (balanced) observations 195

1st equation analysis:

	Coefficient	Std. Error	t-Statistic	Prob.
CointEq1	54.44746	142.5069	0.382069	0.7038
DIFF_EXPORTS(-1)	0.153477	0.472405	0.324884	0.7464
DIFF_EXPORTS(-2)	0.085257	0.426692	0.199809	0.8423
DIFF_EXPORTS(-3)	-0.141096	0.270525	-0.521566	0.6039
DIFF_EXPORTS(-4)	-0.131425	0.193658	-0.678645	0.5000
DIFF_EXPORTS(-5)	0.004452	0.086406	0.051523	0.9591
DIFF_FDI(-1)	-0.871525	0.372423	-2.340148	**0.0226**
DIFF_FDI(-2)	-0.059795	0.479734	-0.124641	0.9012
DIFF_FDI(-3)	0.350677	0.382463	0.916892	0.3629
DIFF_FDI(-4)	-0.271760	0.350612	-0.775102	0.4413
DIFF_FDI(-5)	-0.412146	0.222073	-1.855904	**0.0684**
DIFF_OILPRICES(-1)	-9.259159	30.16850	-0.306915	0.7600
DIFF_OILPRICES(-2)	-1.924068	28.64317	-0.067174	0.9467
DIFF_OILPRICES(-3)	12.62191	19.15265	0.659016	0.5124
DIFF_OILPRICES(-4)	18.70429	14.12600	1.324104	0.1905
DIFF_OILPRICES(-5)	4.358014	7.642142	0.570261	0.5706
DIFF_REER(-1)	-7.891485	8.006558	-0.985628	0.3283
DIFF_REER(-2)	-12.67474	8.842614	-1.433370	0.1569

DIFF_REER(-3)	-6.154747	7.765865	-0.792539	0.4312
DIFF_REER(-4)	10.54540	7.114537	1.482232	0.1435
DIFF_REER(-5)	2.221653	5.943344	0.373805	0.7099
INFOTECH(-1)	375.8116	245.0227	1.533783	0.1303
INFOTECH(-2)	-122.4767	348.8710	-0.351066	0.7268
INFOTECH(-3)	-26.04243	238.9502	-0.108987	0.9136
INFOTECH(-4)	-263.6657	255.5190	-1.031883	0.3063
INFOTECH(-5)	363.5280	280.1473	1.297632	0.1994
Intercept(1st equation)	-5.325211	22.71271	-0.234459	0.8154

2nd equation analysis:

CointEq1	0.058651	0.159977	0.366624	0.7152
DIFF_EXPORTS(-1)	0.000254	0.000530	0.478111	0.6343
DIFF_EXPORTS(-2)	0.000256	0.000479	0.534991	0.5946
DIFF_EXPORTS(-3)	0.000208	0.000304	0.685596	0.4956
DIFF_EXPORTS(-4)	0.000137	0.000217	0.628175	0.5323
DIFF_EXPORTS(-5)	5.06E-05	9.70E-05	0.521172	0.6042
DIFF_FDI(-1)	0.000193	0.000418	0.461216	0.6463
DIFF_FDI(-2)	0.000283	0.000539	0.525283	0.6013
DIFF_FDI(-3)	0.000235	0.000429	0.546609	0.5867
DIFF_FDI(-4)	3.97E-05	0.000394	0.100823	0.9200
DIFF_FDI(-5)	-1.35E-05	0.000249	-0.054299	0.9569
DIFF_OILPRICES(-1)	-0.018001	0.033867	-0.531518	0.5970
DIFF_OILPRICES(-2)	-0.023533	0.032155	-0.731859	0.4671

DIFF_OILPRICES(-3)	-0.024259	0.021501	-1.128310	0.2637
DIFF_OILPRICES(-4)	-0.019390	0.015858	-1.222719	0.2262
DIFF_OILPRICES(-5)	-0.009957	0.008579	-1.160595	0.2504
DIFF_REER(-1)	0.001961	0.008988	0.218148	0.8281
DIFF_REER(-2)	0.005115	0.009927	0.515251	0.6083
DIFF_REER(-3)	0.003601	0.008718	0.413019	0.6811
DIFF_REER(-4)	0.002278	0.007987	0.285165	0.7765
DIFF_REER(-5)	-0.004834	0.006672	-0.724472	0.4716
INFOTECH(-1)	-0.506514	0.275060	-1.841465	0.0705
INFOTECH(-2)	-0.119858	0.391639	-0.306042	0.7606
INFOTECH(-3)	-0.040603	0.268243	-0.151367	0.8802
INFOTECH(-4)	0.227934	0.286843	0.794630	0.4300
INFOTECH(-5)	0.175893	0.314491	0.559294	0.5780
Intercept(2nd equation)	0.000684	0.025497	0.026822	0.9787

Determinant residual covariance	54410903

	Goods Exports (BoP, Current million U.S. dollar)	Imports (BoP, current million U.S. dollars)	REER (non-oil sectors), in % 2000=100	İnflation (GDP deflator)	Final nominal GDP quarterly factual calculated, in million current U.S. dollar	T in co n
31.03.2007	4 033	1 184	90,6	102,1	5914,25	
30.06.2007	5 205	1 416	88,6	100,5	6426,74	
30.09.2007	5 053	1 554	87,6	100,8	6983,06	

31.12.2007	6 951	1 882	89,1	114,4	12008,35	
31.03.2008	7 233	1 414	91,4	137,1	9773,57	
30.06.2008	9 992	1 789	96,5	131,9	12555,98	
30.09.2008	9 001	2 276	101,1	132,7	14647,78	
31.12.2008	4 336	2 071	114,1	127,8	12057,78	
31.03.2009	3 569	1 459	121,4	71,5	8427,25	
30.06.2009	5 250	1 442	110,2	64,6	9432,38	
30.09.2009	5 937	1 681	110,5	68,7	11424,25	
31.12.2009	6 301	1 648	110,0	78,8	13939,50	
31.03.2010	6 255	1 215	111,9	134,3	11939,50	
30.06.2010	6 910	1 725	115,6	125,2	12660,50	
30.09.2010	6 842	1 658	112,5	115,6	12035,00	
31.12.2010	6 367	2 065	115,3	111,3	15333,38	
31.03.2011	8 514	1 963	114,4	111	13026,38	
30.06.2011	9 681	2 552	111,6	112,5	15310,63	
30.09.2011	8 555	2 623	117,3	111,4	15274,18	
31.12.2011	7 643	2 917	121,6	117,8	19602,41	
31.03.2012	8 963	2 140	117,9	109,3	15555,82	
30.06.2012	8 038	2 480	119,4	102	17180,00	
30.09.2012	7 561	2 466	115,1	101	17594,05	
31.12.2012	7 812	3 107	114,8	101,5	18249,23	
31.03.2013	8 273	2 383	116,6	97,3	16598,21	
30.06.2013	7 558	2 993	116,1	98,4	18276,15	

30.09.2013	7 924	3 026	117,7	99,6	19930,77	
31.12.2013	7 947	2 520	120,3	99,6	19179,74	
31.03.2014	7 504	1 960	124,3	99,1	16859,87	
30.06.2014	8 090	2 506	120,4	102,3	19990,13	
30.09.2014	7 338	2 258	125,8	100,7	19746,67	
31.12.2014	5 328	2 608	140,7	98,7	19015,90	
31.03.2015	4 250	2 492	118,4	82,1	10976,19	
30.06.2015	4 427	2 427	111,2	87,5	14038,19	
30.09.2015	3 646	2 102	119,7	88,2	13726,95	
31.12.2015	3 263	2753	107,6	91,1	8765,19	
31.03.2016	2 552	1930	87,2	113,1	8322,73	
30.06.2016	3 709	2397	89,1	109,3	9926,01	
30.09.2016	3 274	2293	84,6	112,9	9731,05	
31.12.2016	3 676	2384	86,3	114,7	9410,79	
31.03.2017	3 556	1666	89,4	129,2	8976,45	
30.06.2017	3 555	1966	87,5	119,1	10284,30	
30.09.2017	3 680	2758	86,7	118	10847,65	
31.12.2017	4 361	2648	89,8	116	11029,24	
31.03.2018	4 580	2166	87,1	109,9	10186,76	
30.06.2018	5 338	2733	90,9	114,8	11583,24	