



Review of energy-growth nexus: A panel analysis for ten Eurasian oil exporting countries



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ABSTRACT

The paper examines the energy-growth nexus in ten oil-exporting developing Eurasian countries: Azerbaijan, Bahrain, Iran, Kazakhstan, Kuwait, Oman, Qatar, Russia, Saudi Arabia and the UAE over the period 1997–2014.

Lack of enough energy-growth nexus studies on the oil exporters of the Middle East and Commonwealth of Independent States coupled with a number of issues, which have not been addressed by prior studies motivate us to conduct this review.

Policymakers should take into consideration that any policy measures aimed at conserving the Primary Energy Consumption can undermine economic growth, as we find that the growth hypothesis dominates in the Primary Energy Consumption-growth nexus. Conversely, validity of the neutrality hypothesis in the Residential Electricity Consumption-growth nexus, another finding of this study, implies that policymakers can pursue conservation policy by reconsidering the residential electricity subsidies in the selected countries.

The study contributes to the energy-growth literature by addressing some issues and filling the gap for the Eurasian oil exporting countries, especially those in the Middle East and Commonwealth of Independent States.

1. Introduction

The growth theories show that sustainability of economic growth is one of the key points, which, amongst other preconditions, depends on the effective use of production factors [114,123,124,16]. Energy, as one of the important factors of growth has attracted great attention in the last four decades [79,18,2]. Energy and growth are interrelated: on the one hand, energy is an important factor of production [113,130], on the other, economic growth results in higher living standards, which in turn boosts energy consumption [143,87,127]. Thus, a relationship between energy and growth has been a crucial topic in the literature over the last four decades since the pioneering study by Kraft and Kraft [76].

It is worth noting that most of the energy-growth nexus studies are devoted to the developed and developing oil importing countries

[35–37,48,52,53,82,117,125,126]. The majority of the prior studies have examined the nexus in mixes of developing oil exporters and oil importers since their research aim was country group or region, but not the oil exporters specifically (see [6,22]). As [107,42], among others state, few studies have investigated the energy-growth nexus in a pure set of oil-exporting developing economies. Consequently, there is a gap in the literature on oil exporting developing economies. Many oil exporting developing economies are located in Eurasia, concentrated in the Middle East (ME) and Commonwealth of Independent States (CIS).¹ However, we are not aware of studies investigating the energy-growth nexus for a pure set of oil exporting developing economies of Eurasia, including those from the CIS and ME.² Furthermore, there are only few studies [104,107,116] examining this nexus for a pure set of ME oil exporters to the best of our review. However, as discussed in the next section, oil exporters in ME and CIS

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¹ Eurasia contains 103 countries (https://en.wikipedia.org/wiki/List_of_Eurasian_countries_by_population). The Middle East and CIS oil exporters comprise Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, Syria, Yemen, the United Arab Emirates (UAE) and Azerbaijan, Kazakhstan, Russia [136].

² Al-Iriani [6], Mehrara [88] and Squally [127], Ozturk and Al-Mulali [107] among others investigated the energy-growth nexus in oil-exporting economies. However, they did not analyze the CIS oil-exporting countries. On contrary, Apergis and Payne [11,12] and Bildirici and Kayikçi [23] studied these countries but in the mix of oil importers of the former Soviet Union because the research focus was the entire former Soviet Union, not the oil exporters. Damette and Seghir [42] included only Russia, missing Azerbaijan and Kazakhstan.

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Table 1
Top ten countries in terms of proven reserves and exports of crude oil.

Country	Proven crude oil reserves in billion barrels	Country	Exports of crude oil including lease condensate in USD billions
Venezuela	297.74 (18.0)	Saudi Arabia	133.30 (17.0)
Saudi Arabia	268.35 (16.2)	Russia	86.20 (11.0)
Canada	173.20 (10.5)	Iraq	52.20 (6.6)
Iran	157.30 (9.5)	UAE	51.20 (6.5)
Iraq	140.30 (8.5)	Canada	50.20 (6.4)
Kuwait	104.00 (6.3)	Nigeria	38.00 (4.8)
UEA	97.80 (5.9)	Kuwait	34.10 (4.3)
Russia	80.00 (4.8)	Angola	32.60 (4.1)
Libya	48.47 (2.9)	Venezuela	27.80 (3.5)
Nigeria	37.14 (2.2)	Kazakhstan	26.20 (3.3)

Note: Proven crude oil reserves in Billion Barrels in 2014 are from US EIA International energy statistics. Exports of Crude Oil including Lease Condensate in USD Billions in 2015 are collected from the Central Intelligence Agency. Numbers in parentheses are percent shares in the world total.

compared to those in other regions in the world, have some specific features, which make them very interesting and important to study.

In addition to concluding that the energy-growth literature for oil exporting economies of CIS and ME are very limited, we also found a number of issues, which were not addressed in the literature. These issues are: Potentially spurious results due to employing a bivariate framework; Obtained results are mixed and/or conflicting due to not using different measures of energy consumption as a robustness check; Inappropriateness of suggested policy recommendations due to using the mixture of energy exporters and importers; Poorly established theoretical underpinnings for empirical analyses.³

Thus, lack of enough studies coupled with the above-mentioned issues motivate us to conduct this study.

The objective of this paper is to examine the energy-growth nexus in the panel of ME and CIS oil exporting economies by addressing all of the above-mentioned issues.

Our paper can contribute to the energy consumption-economic growth literature by the following number of ways. First, this is the pioneer energy-growth study that considers all the three CIS oil exporters, Azerbaijan, Kazakhstan and Russia, along with other Eurasian oil exporting developing countries, but not mix of energy exporters and oil importers. Second, we use two different measures for energy consumption as a robustness check. Third, considering that most of the prior studies on oil exporting developing economies are subject to omitted variable bias problem due to employing bivariate framework, this is one of the limited studies that considers multivariate framework of augmented production function. Moreover, the study sheds light on the policy debate on whether or not there is room to cut the energy subsidies in the oil-exporting developing countries, although it is not the main focus and thus not considered significantly here. Finally, we use the most recent annual data which includes the year of 2014. We tried to expand our data coverage up to 2015. However, we were able to do that only for macroeconomic indicators (GDP, Foreign Direct Investments and Employment) as many energy indicators, including Primary Energy Consumption and Residential Electricity Consumption used in this study, are not available up to 2015 from the reliable sources.

Policymakers in the selected countries should consider that any policy implementations aimed at reducing the Primary Energy Consumption can deter economic growth, as we find an evidence of growth hypothesis in the Primary Energy Consumption-growth nexus. Conversely, validity of the neutrality hypothesis in the Residential Electricity Consumption-growth nexus implies that policymakers can

³ To keep this section concise, we discuss the mentioned issues in Section 3 Literature Review.

pursue conservation policy by reconsidering the subsidies and or prices for Residential Electricity Consumption. Briefly note that this policy measure has been implemented in some countries, including Saudi Arabia, UAE, Kuwait and Azerbaijan in 2016 due to the drop in oil price and thus in government revenues.

2. Background

As mentioned in the section above, the ME and CIS oil exporters have some features, which make them an interesting case to study from the energy-growth perspective. In this section, we briefly discuss these features. The section describes first the role of the countries in the energy world and then the importance of oil (and gas) exports in these economies. It finally, illustrates how economic growth and energy consumption in these countries evolve over the last two decades.⁴

It is worth mentioning that a number of oil-exporters in the region, especially GCC countries, as members of OPEC, play a decisive role in the dynamics and management of the world's energy markets and their role will be more crucial in the future [131] *inter alia*). Yet, the CIS oil exporters have also become important players in the world's energy markets as non-OPEC oil producers and distribution centers ([23] among others). World Bank reports that the CIS oil exporters account for 15% of global oil production, while calculations based on the United States Energy Information Administration data show that they had on average 12% of the total world oil supply over the period 1992–2012 [141,136]). Note that the six out of top ten countries over the world in terms of proven reserves and exports of crude oil were from the ME and CIS as reported in Table 1 [136,38].

Fig. 1 compares ME and CIS to other regions of the world in terms of proven reserves, production and exports of crude oil and natural gas using [136] data.⁵

The oil exporters of the ME and CIS held more than half of the global proven crude oil reserves in 2014 being about 55.7%. Saudi Arabia's share of the world's proven oil reserves amounts to a whopping 16.2%, which is higher than the North American region (13.3%) and the combined total of Africa, Asia & Oceania, and Europe

⁴ We try to provide more information in terms of time while avoiding noise and being reader-friendly in our tables and figures. To this end, we present the last two decades' data in 5-year averages.

⁵ US EIA brakes the entire world into seven regions, namely North America, Central and South America, Europe, Middle East, Eurasia, Africa, Asia and Oceania. For the purpose of this study, we modified Eurasia to CIS by excluding Estonia, Latvia, Lithuania and Georgia and then combined it with Middle East. In order to avoid confusion, note that definition of Eurasia in US EIA is different from the conventional definition of it. In this paper, we refer to the conventional definition of Eurasia, which covers 103 countries as mentioned in footnote 2.

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