Natural resource export revenues and construction activities in OPEC countries

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Abstract

The purpose of this study is to analyse the interrelationship between natural resource export revenues and construction activities for a set of the OPEC countries over the period of 1980-2013. By applying panel cointegration and panel causality tests, our results show that the Natural resources rents percentage of GDP (as a measure for natural resource export revenues) increases the GDP from construction industry (as a measure for construction activities) in the short-run but not in the long-run.

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1. Introduction

The impacts of petroleum export revenues (oil in particular) on aggregate stock returns have been investigated in many developed countries (e.g. Park and Ratti, 2008) and Middle Eastern countries (e.g. Fayyad and Daly, 2011; Gholipour, 2011a), but there are few studies that have looked at the effects of natural resource export revenues on particular industries (Jimenez-Rodriguez, 2008). More specifically, research on the construction industry in the Organization of Petroleum Exporting Countries (OPEC) remains very scant.

The purpose of this study is to explore the role of petroleum export revenues on the construction industry in a set of the OPEC countries. Petroleum and construction industries are the pillars of most of the OPEC countries, and therefore, their join effects on business cycle of these countries are un-negligible. For example, in one of the earliest studies in this area, Shaw (1979) reported the significant importance of construction industry on employment rate in Arab oil exporting countries. In addition, Looney (1989) also demonstrated that government expenditures have a major role in stimulating construction industry in Saudi Arabia. There is also evidence that shows on average, a one percentage point increase in the construction share (as a percent to GDP) is associated with about a one percentage point reduction in the unemployment rate (Gholipour, 2011b). Table 1 shows the importance of the construction industry in gross domestic product (GDP) of some of the OPEC countries. According to Abed and Davoodia (2003), certain level of infrastructure is needed to accommodate the growing population in the region and the expanding private sector activity, but investment in the construction sector in the OPEC countries is disproportionate to other, more productive, investments. Therefore, given the significant role of the construction industry in national economies, understanding the characteristics of this sector and its association with oil price changes should have substantial importance for OPEC countries. This study aims to address this gap.

Table 1. Proportion of GDP from construction in some of the OPEC countries

	2004	2014
Algeria	7.33%	9.41%
Iran	6.61%	9.52%
Qatar	5.43%	5.08%
Saudi Arabia	5.43%	4.89%
UAE	8.71%	8.40%

Source: Euromonitor International (2016)

The most extensively explored theories on the direct effects of oil price shocks include an input-cost effect, that higher energy cost lowers usage of oil which in turn lowers productivity of capital and labour; and an income effect, that higher cost of imported oil reduces disposable households' incomes (Jimenez-Rodriguez, 2008). These theories explicitly look at the impacts of oil price shocks on oil importing economies which clearly have different economic

fundamentals. In addition to above, Hamilton (1983, 1996) proposes an alternative theory which may be a better fit for this study. He suggests that oil price shocks influence the economic cycles mainly because a sharp rise in oil price increases uncertainty which leads to changes in operating costs and investment decisions. Sharp changes in oil price clearly add to markets uncertainty, however, the budget surplus (deficit) generated from increase (decrease) of oil-exporting countries revenue can potentially alter their investment plans for different economic sectors including the construction industry.

2. Previous Studies

Several studies have looked at the effects of oil price shocks on stock returns. In South Africa, for example, Gupta and Modise (2013) showed that stock returns only increase with oil prices when global economic activity improves. They suggested three types of shocks to the global oil market.

First, the oil supply shock which reflects unexpected changes in the physical volume of oil. Second, the aggregate demand shock which corresponds to changes in the demand for industrial commodities that are driven by fluctuations in the global business cycle. Third, the speculative demand shock which captures changes in oil prices driven by speculative motives and forward-looking behaviour (Kilian and Park, 2009).

Park and Ratti (2008) revealed that oil price shocks had a statistically significant impact on real stock returns in the U.S. and 13 European countries. Similarly, Ono (2011) examined the same relationships in the Brazilian, Russian, Indian and Chinese (BRICs) stock markets. They found Russia stock market, the only oil-exporting country in BRICs, has the highest level of sensitivity to oil price shocks. Park and Ratti (2008) reported that the contribution of oil prices to variability in real stock returns was statistically significant for Norway, a major oil-exporting country, with a value around 6%.

In Middle East, Fayyad and Daly (2011) investigated the relationship between oil price and stock market returns for the Gulf Cooperation Council (GCC) Countries. They showed that the predictive power of oil for stock returns increased after a rise in oil prices and during the Global Financial Crises periods. In addition, they presented evidence that Qatar and the UAE stocks markets are very responsiveness to oil shocks. In another study, Mohanty et al. (2011) illustrated that all the GCC, except for Kuwait, stock markets have significant positive exposures to oil price shocks. At the industry level, the responses of industry-specific returns to oil shocks are significantly positive for 12 out of 20 industries. In addition, Arouri and Rault (2011) used a bootstrap panel cointegration technique and showed that positive oil price shocks have positive impact on the stock market performance of GCC countries. Hammoudeh

and Aleisa (2004) also found a bidirectional relationship between oil prices and stock markets, in these countries.

Ftiti et al. (2014) examined the impact of oil prices on economic growth of the four major OPEC countries (UAE, Kuwait, Saudi Arabia and Venezuela) in the 2000s. Their results showed that oil price shocks have both the medium-term and short-term effects on economic growth. They also found that the high level of relationship between oil and economic activity is partially due to expansion of the housing market and construction industry in those oil exporting countries.

In summary, there is a lack of attention by researchers to the impact of oil shocks on specific industries such as construction industry in OPEC countries. This study contributes to the literature by providing new evidence about the influence and the duration of impact of oil price shocks on the construction industry in selected OPEC countries.

3. Methodology and Results

This study evaluates long-run relationship and short-run linkage between the natural resource export revenues (*Natural resources rents percentage of GDP*) and construction activities (*Construction percentage of GDP*) of the OPEC countries over the period 1980-2013. Our data set are unbalanced panel due to unavailability of data for some of the OPEC countries for few years. Our sample of countries include Algeria, Bahrain, Ecuador, Indonesia, Iran, Kuwait, Nigeria, Qatar, Saudi Arabia, United Arab Emirates, Venezuela. Data for natural resource export was obtained from World Bank and for construction activities from Euromonitor International.

The dynamic causal relationship between these two variables is examined by the panel cointegration approach. The analysis has three steps. The first step is to verify the order of integration for the variables, because the various cointegration tests are valid only if the variables have the same order of integration. We employ two types of unit root tests: Levin, Lin and Chu (2002) and Im, Pesaran and Shin (2003). The results suggest that two series appear to contain a panel unit root in their levels but are stationary in their first differences, indicating that they are integrated at order one (see Table 2).

Table 2. Results of panel unit root tests

Variable	Unit Root Tests			
	Levin, Lin & Chu t-stat		*Im, Pesaran and Shin W-stat*	
	Level	1st diff.	Level	1st diff.
Construction % of GDP	-0.833	-3.798***	-1.634	-7.052***
Natural resources rents % of GDP	-2.053	-2.626***	-1.551	-11.486***

Note: *** indicates the rejection of the null hypothesis at 1% level of significance. The lag lengths are selected using AIC.

In the second step, when all series are integrated into the same order, Pedroni and Kao methods are used to test whether there is a long-run cointegration relationship between the variables. The Pedroni tests are based on the Engle and Granger (1987) two-step (residual based) cointegration tests. Pedroni (1999, 2004) provides seven statistics to test the null hypothesis of no cointegration in the heterogeneous panels. Out of seven, four tests are within the dimension (panel tests) and three tests are between dimensions (group tests). The Kao cointegration test follows the same basic approach as the Pedroni test, but it specifies cross-section specific intercepts and homogeneous coefficients on the first-stage regressors. The results of panel cointegration between variables are presented in Table 3. Six of the seven Pedroni tests suggest that there is panel cointegration among the variables. Similarly, the Kao test suggests panel cointegration at 5% level of significance. It means that a long-run relationship exists between two variables.

Table 3. Results of panel cointegration tests

Pedroni test	
Test statistics	*Statistics*
Panel v- Statistic (weighted)	-1.830
Panel rho- Statistic (weighted)	-4.834***
Panel PP- Statistic (weighted)	-4.191***
Panel ADF- Statistic (weighted)	-3.329***
Group rho-Statistic	-2.021**
Group PP-Statistic	-4.764***
Group ADF-Statistic	-3.288***
Kao Test	
ADF	-2.358**

Note: ** and *** indicate the rejection of the null hypothesis at 5% and 1% level of significance, respectively.

Finally, since a long-run relationship between the variables is found, the last step is to estimate the panel vector error correction model (VECM) in order to examine the Granger causal relationship between the variables. The VECM is used for correcting disequilibrium in the cointegration relationship, captured by the error correction term (ECT), as well as to test for long-run and short-run causality among cointegrated variables. If the ECT is statistically significant, it can be concluded that a long-run relationship exists among the variables. The

panel Granger causality results presented in Table 4 and shows unilateral causality running from the natural resources rents % of GDP to the Construction % of GDP in the short-run. In other words, increases in natural resources exports have an immediate positive impact on construction activities in OPEC countries. However, in the long-run, natural resource exports do not Granger cause construction activities in OPEC countries.
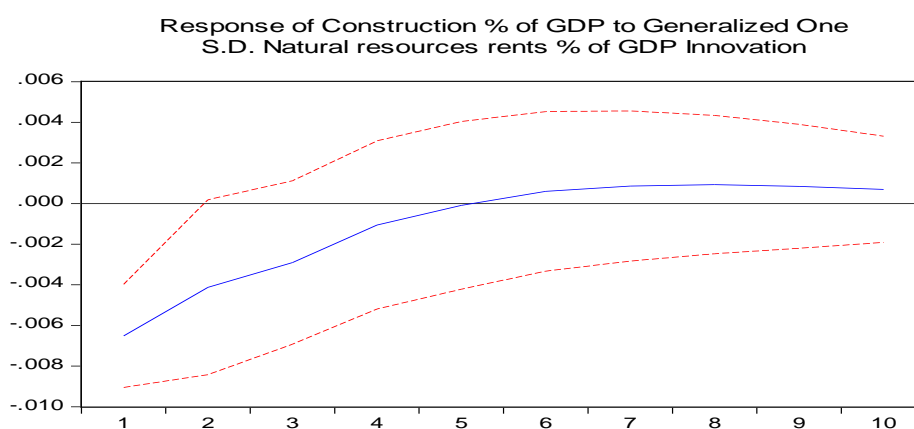
Table 4. Results of the panel causality test

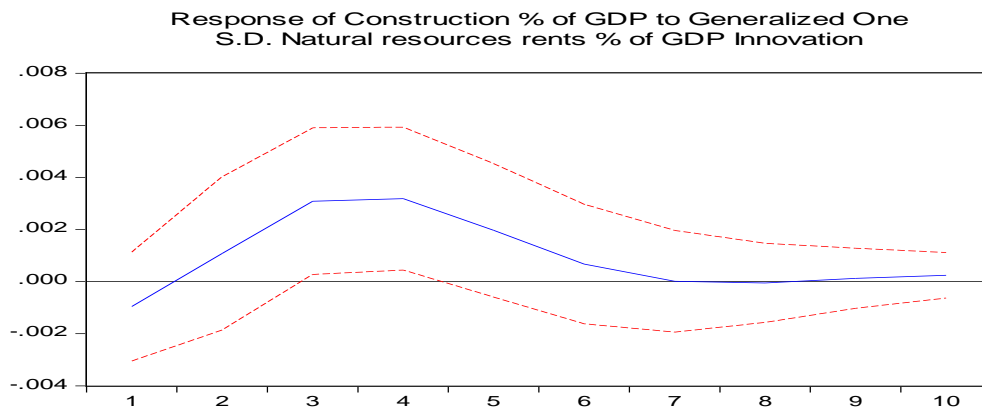| Dependent Variable	Source of causation		
	Short-run		Long-run
	Δ Construction % of GDP	Δ Natural resources rents % of GDP	ECT (-1)
Δ Construction % of GDP	-	7.866***	-0.050
Δ Natural resources rents % of GDP	0.154	-	-3.319

Note: *** and ** indicate 1% and 5% of significance, respectively.

We also use the generalized impulse response functions (GIRFs), developed by Pesaran and Shin (1998) to trace the time paths of the effects of natural resources exports shocks on construction activities in each country separately. Figure 2 illustrates the GIRFs of Construction % of GDP to Natural resources rents percentage of GDP shocks for those countries which have at 30 observations. The shock to the equation is equal to one standard deviation of the equation residual, and the impulse responses of the variables to the shock are traced out for a period of 10 years. The upper and lower standard error bounds (±2 standard errors) of the impulses are computed using Analytic (asymptotic). Similar to results of Granger-causality tests, the GIRFs for most countries suggest that increased natural resource exports shocks induce an immediate positive impact on construction activities but the effects of shocks to die out completely after two to three years.
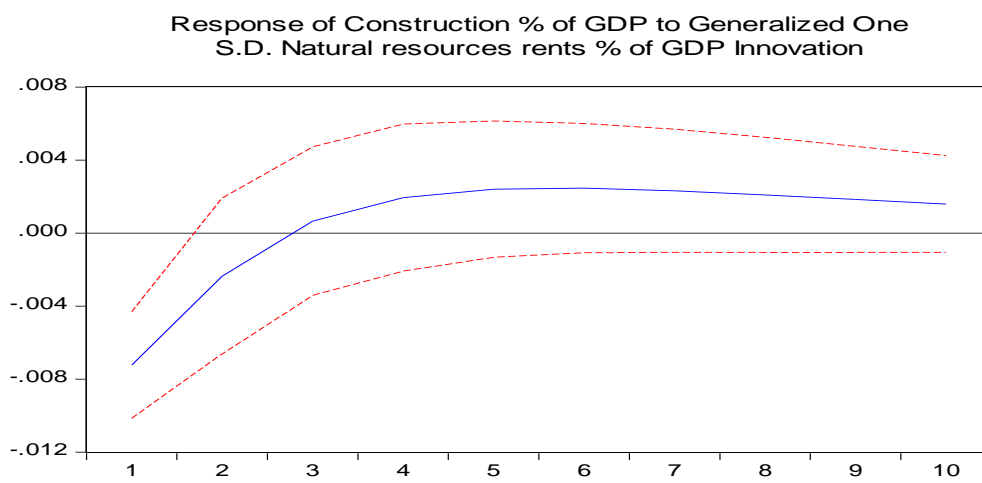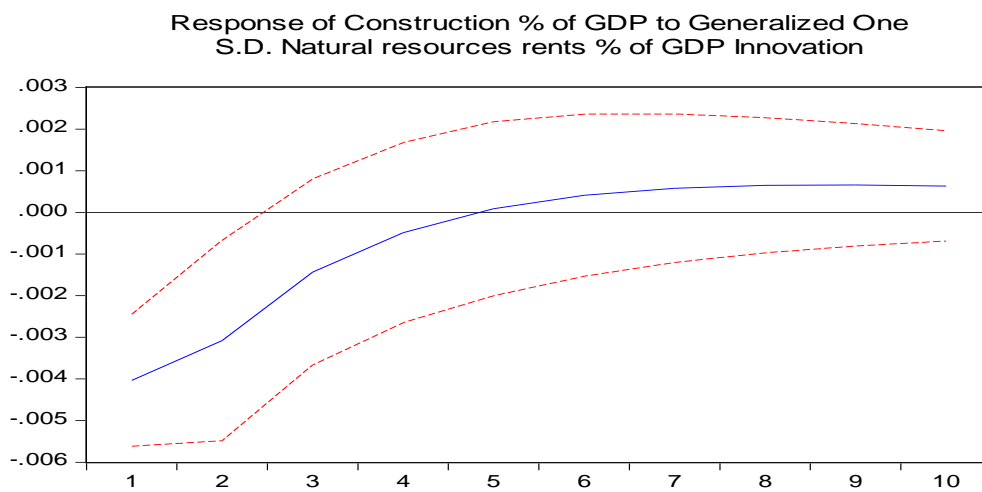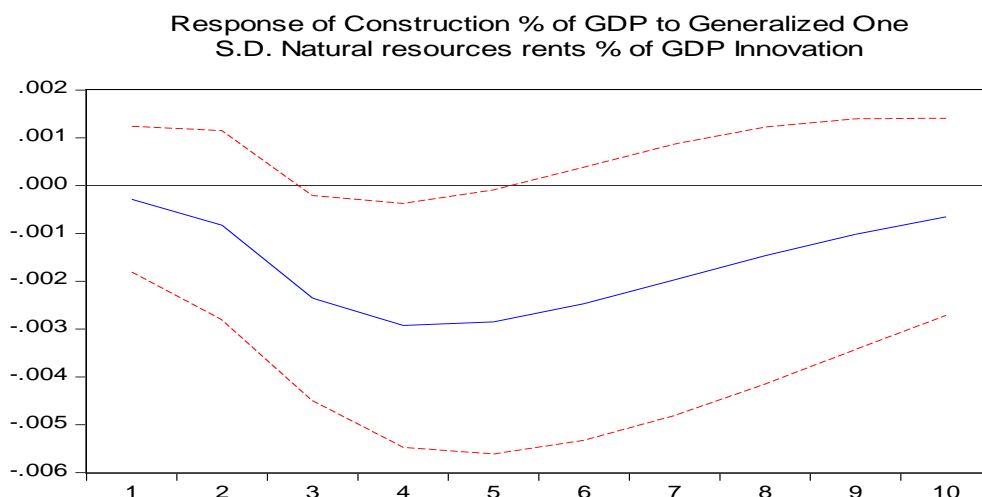
Algeria

Response of Construction % of GDP to Generalized One S.D. Natural resources rents % of GDP Innovation

Qatar

Response of Construction % of GDP to Generalized One
S.D. Natural resources rents % of GDP Innovation

UAE

Response of Construction % of GDP to Generalized One
S.D. Natural resources rents % of GDP Innovation

Saudi Arabia

Response of Construction % of GDP to Generalized One
S.D. Natural resources rents % of GDP Innovation

Nigeria

Response of Construction % of GDP to Generalized One
S.D. Natural resources rents % of GDP Innovation

Venezuela

Response of Construction % of GDP to Generalized One
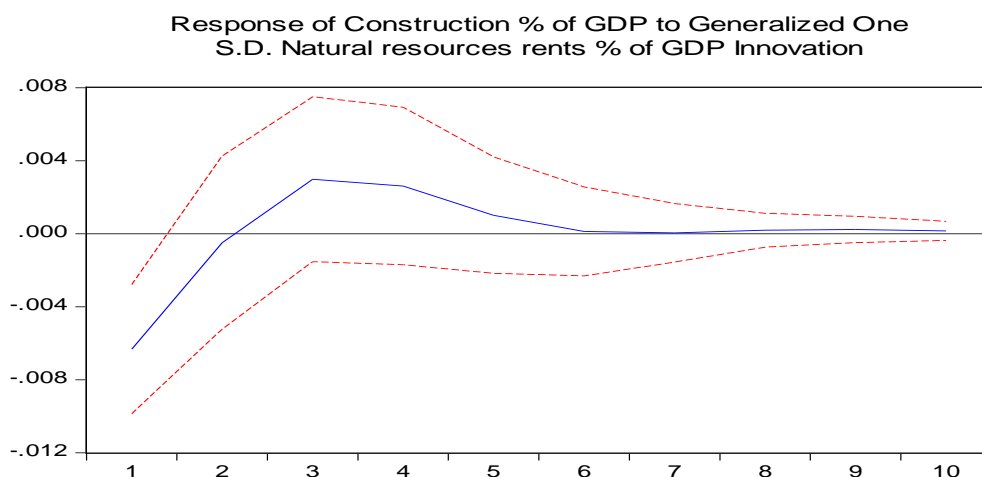S.D. Natural resources rents % of GDP Innovation

Figure 2. Results of GIRFs for a set of OPEC countries

4. Conclusion

In this study we analysed the interrelationship between petroleum export revenues and construction activities for a set of the OPEC countries over the last three decades. By applying panel cointegration and panel causality tests, our findings suggest that increased natural resource (petroleum) exports shocks induce an immediate positive impact on construction activities but the effects of shocks to die out completely after two to three years.

These results might have some implications for construction firms operating in the OPEC countries. During periods of positive shocks to petroleum export revenues, OPEC governments and their agencies increase their investments in construction activities. As a result, construction sector experiences rapid boost in its growth. Therefore, construction firms may track and utilize these opportunities by observing oil price shocks.

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