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The Impact of Oil Rent, Currency Overvaluation, and Institution Quality, on Economic Growth of Oil-Rich Countries:

A Heterogeneous Panel Data Study

by

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ABSTRACT

This paper investigates several key challenges faced by oil-rich countries regarding their economic growth and development. First, it discusses how to determine currency overvaluation for these countries (if any). To determine the overvaluation, the real exchange rate (RER) is calculated and the Balassa–Samuelson effect is estimated via a regression model. Next, the study presents an empirical model for assessing the impact of oil rent on economic growth in the context of currency overvaluation and the institutional quality in every country. As a dynamic model, both endogeneity and heterogeneity are expected across cross-sections because countries are different in culture, customs, and political institutions. Consequently, heterogeneous panel data analysis is undertaken using the error correction model cointegration technique and the mean group estimation method in an autoregressive distributed lag model. Finally, the study concludes the findings and provides policy recommendations by offering a new perspective on an ongoing dilemma, discussing the challenges and limitations facing developing oil-rich countries and how their path to success may differ from other countries.

JEL classification: D72; E02; F43; O47; Q43

Keywords: Natural resources; Rent-Seeking; Institutions; Economic Growth; Energy Economic

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1. Introduction

This study aims to investigate the role of currency overvaluation, oil rent, and institutional quality on the economic growth of oil-rich countries. 'Oil-rich country' is defined as one for which oil exports comprise 10% or more of its gross domestic product (GDP)[1]. Because the driving force of growth changes during different stages in economic development, economists analyze the composition of various factors in different countries and regions. Such models look closely at the impact of structural change as well as political and financial institutions on economic growth and the effect of a variety of subfactors including distribution conflicts, market failures, credit constraints, migration, urbanization, changes in mortality and fertility rates through health improvement, inequality, and trade.

One key to evaluating modern economic growth is to examine the causes underlying cross-country differences in income per capita (Acemoglu, 2009). As the focus in macroeconomic modeling shifts from short- to long-run relationships amongst variables, it becomes necessary to observe the interaction of variables over time. Hence, a dynamic approach, or the use of lag variables, is an essential part of current macroeconomic models. When considering an oil price shock, a change in the money supply, or a change in a country's trade policy, understandably, it may take more than a year or two to see the full effect of these shocks or disturbances on the economy. Similarly, one's consumption decisions are most likely related to last month's salary more than to this month's. Moreover, since there are more detailed data available for many countries, by combining the cross-sectional data of different countries to time series data, modern macroeconomic models are not only more dynamic but can also make a more efficient analysis.

[1] See (Mehlum, Moene and Torvik 2006)

Thus, this study aims to investigate how, if at all, natural resources' rent, specifically for crude oil, causes slower economic growth rates in oil-rich countries with lower quality institutions. The study analysis also includes an exploration of how the combination of natural resources' rent and overvaluation may cause growth rates slow even more. Moreover, this study explores how natural resources' rent works and the role of exchange rates.

Although academic literature and empirical studies in this area are plentiful, this research offers three new contributions to the existing literature. First, as it has been suggested that petroleum creates the majority of problems for most countries (Ross 2012), this research distinguishes between the types of natural resources by focusing solely on crude oil. Furthermore, this study differentiates between natural resource abundance (reserves) and dependency (exports). Brunnschweilera and Bulte (2008) were pioneers in distinguishing between these two aspects; however, unlike these scholars, it appears that natural resource dependency (i.e., the ratio of crude oil exports to GDP) is a more meaningful variable to demonstrate how the economic growth of oil-rich countries may be related to their natural resources. Secondly, the study introduces an interaction variable ‘OilRent-Overvaluation' to better explains the rent-seeking impact on growth. Third, this study employs a heterogeneous panel data model to address both endogeneity and heterogeneity problems, as Cavalcanti et al. (2011) argued that cross-country heterogeneity could produce biased and misleading results.

1.1 Oil-Rich Countries

The phrase ‘oil-rich country' may be indicative of either a country's oil reserves by volume or the percentage their GDP comprisedc of oil exports. Oil reserves measure the oil abundance of a country, whereas the oil export percentage to GDP ratio refers to the oil dependence of a country.

The Organization of the Petroleum Exporting Countries (OPEC) database lists 33 countries as the world's oil exporters based on their barrel per day exports. Countries such as Syria and Libya do not have enough data, and data for Russia is only available after 1990 following the collapse of the Soviet Union; hence, they have been removed from consideration. For the analysis of oil dependency in countries, it is more common to consider those countries for which oil exports comprise 10% or more of their GDP. Including this factor removes another four countries, i.e., Vietnam, China, Equatorial Guinea, and Sudan. The remaining 26 countries were included in most regression models in this study using data for the period between 1980 and 2017. Saudi Arabia, which exports 7.5 million oil barrels per day, is the biggest oil exporter worldwide and Trinidad and Tobago, which exports 65,000 barrels per day, is the smallest exporter.

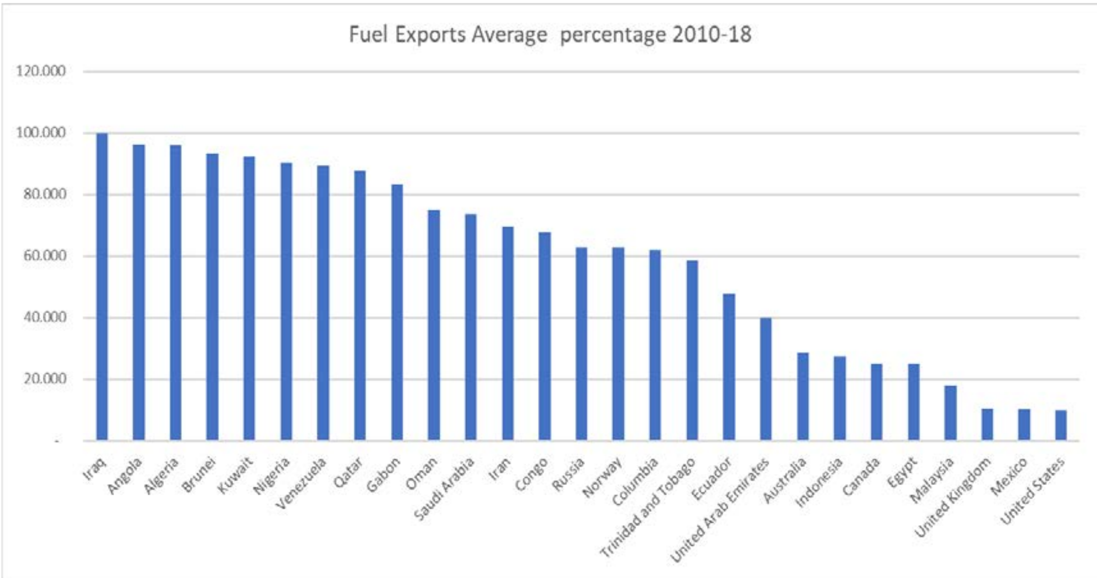

Figure 1.1 Fuel exports average (%), 2010–2018. Source: WDI.

1.2 Rent-Seeking

In his recent book, *The Price of Inequality: how today's divided society endangers our future*, Joseph Stiglitz (2013) explains rent-seeking, noting that "the term 'rent' was originally used to describe the returns to land" (49) because the landlord received such payments based on his ownership of the land and not because of anything he did. The term was then extended to include monopoly rents, which is the income one receives from the control of a monopoly that is usually an exclusively government-granted right, for instance, to import a limited amount or quota of a good (Stiglitz 2013). Natural resource-rich countries are known for rent-seeking activities as it is "far easier to get rich in these countries by gaining access to resources at favorable terms than by producing wealth" (39-40). In this way, wealth can be taken away from others, creating an unequal balance of power and slower economic growth. On the other hand, rent-seeking can be a mechanism to "capture the economic rent arising from price distortions and physical controls caused by excessive government intervention, such as licenses, quotas, interest rate ceilings, and exchange control" (Todaro & Smith 2012, 522).

1.3 Institutions

Acemoglu et al. (2008) claim that institutions are the fundamental cause of differences in economic growth and development among countries. Additionally, "there is convincing empirical support for the hypothesis that differences in economic institutions, rather than luck, geography or culture, cause differences in incomes per capita" (Acemoglu 2009, 123). North and South Korea are a good example. South Korea, although not democratic in early-stage, under the capitalist organizations and institutions respected private ownership as a means of production, facilitated investments and, as a result, had rapid economic growth and development while North Korea under communist institutions and policies experienced minimal economic growth. Rapid growth in China after 1978 did not occur because of Chinese geographical or cultural change or sudden discovery of what to do. Rapid economic growth occurred because of a dramatic shift in the Communist Party toward those who pushed for institutional reforms (Acemoglu et al. 2008).

Mehlum et al. (2006) claim that the quality of institutions plays a crucial role in growth diverging experiences across resource-rich economies the resource curse since the growth performance differences among resource-rich countries is mainly due to how the institutional arrangement distributes resource rents. Aslaksen (2008) suggests that Oil has adverse impoct on corruption in both democratic and nondemocratic countries. However, Bhattacharyya and Hodler (2010) argue that natural resource feeding corruption depends on the quality of democratic institutions. Hence, it is difficult, if not impossible, to talk about the role of natural resources in economic growth without considering the quality of institutions in the model.

How to measure the quality of institutions collectively is a challenging task. Fortunately, in recent years several organizations compile reliably more comprehensive data in this regard in a historical database that can be used easily in regression models. Two of them that more being cited by scholars are Freedom House (FH) and Polity IV. FH provides data for many countries from 1972 in two main categories: political rights (PR) and civil liberties (CL). PR and CL measured on a 1 to 7 scale, with one,1, representing the highest degree of freedom and seven,7, the lowest. Countries whose combined average ratings for PR and CL fall between 1.0 and 2.5 are designated "free," between 3.0 and 5.0 "partly free," and between 5.5 and 7.0 "not free".

Polity IV collects, creates, and provides data for more countries and more years relating to countries' political regimes, characteristics, and transitions. Recently, they created a specific time series variable named POLITY2 to describe a country's quality of institutions based on a combination of two factors: DEMOC, which determines institutionalized democracy based on (1) the presence of institutions and procedures that citizens can express actual preferences about alternative policies and leaders, (2) the existence of traditional constraints on the exercise of power by the executive, and (3) the guarantee of CL to all citizens in their daily lives and acts of political participation; and AUTOC, which measures institutionalized autocracy based on the lack of legalized political competition and political freedoms. The POLITY2 variable computed on a scale of +10 (solidly democratic) to –10 (strongly autocratic) by subtracting the AUTOC score from the DEMOC score[2]. Several countries, such as Brunei and Colombia, have not been rated by Polity IV. Therefore, in some regressions, either FH data used for all countries or the POLITY2 equivalent of FH data calculated and replaced for these two countries. Some countries in this study have a solid score for all of the study period (1980-2017). The scores for some other countries have improved during the years or declined. The table below shows the average score of all years for each country.

[2] More details about these variables can be found in POLITY IV Project Dataset Users' Manual 2017.

Table 1.1 Quality of Institutions by Country, All Years Average Score

	Code	Country	GDP per capita	All Years Average Polity2	All Years Average FH
1	DZA	Algeria	6,920	-3	6
2	AGO	Angola	3,343	-4	6
3	AUS	Australia	17,475	10	1
4	BRN	Brunei	18,066	-7	5
5	CAN	Canada	20,008	10	1
6	COL	Colombia	5,726	6	3
7	COG	Congo	1,640	-4	5
8	ECU	Ecuador	5,784	7	3
9	EGY	Egypt	3,691	-5	5
10	GAB	Gabon	7,049	-4	5
11	IDN	Indonesia	1,740	0	4
12	IRN	Iran	8,129	-4	6
13	IRQ	Iraq	2,377	-5	6
14	KWT	Kuwait	29,098	-8	5
15	MYS	Malaysia	4,848	4	4
16	MEX	Mexico	10,116	4	3
17	NGA	Nigeria	2,241	1	5
18	NOR	Norway	17,806	10	1
19	OMN	Oman	9,750	-9	6
20	QAT	Qatar	40,957	-10	6
21	SAU	Saudi Arabia	16,419	-10	7
22	TTO	Trinidad and Tobago	15,842	9	2
23	ARE	United Arab Emirates	36,303	-8	6
24	GBR	United Kingdom	15,542	10	1
25	USA	United States	23,991	10	1
26	VEN	Venezuela	8,924	6	3

The Economist Intelligence Unit created the figure below for the 2019 Democracy index. According to this index, all developing oil-rich countries in the Middle East, North Africa, and South America are in authoritarian regimes category either dark or light orange color.

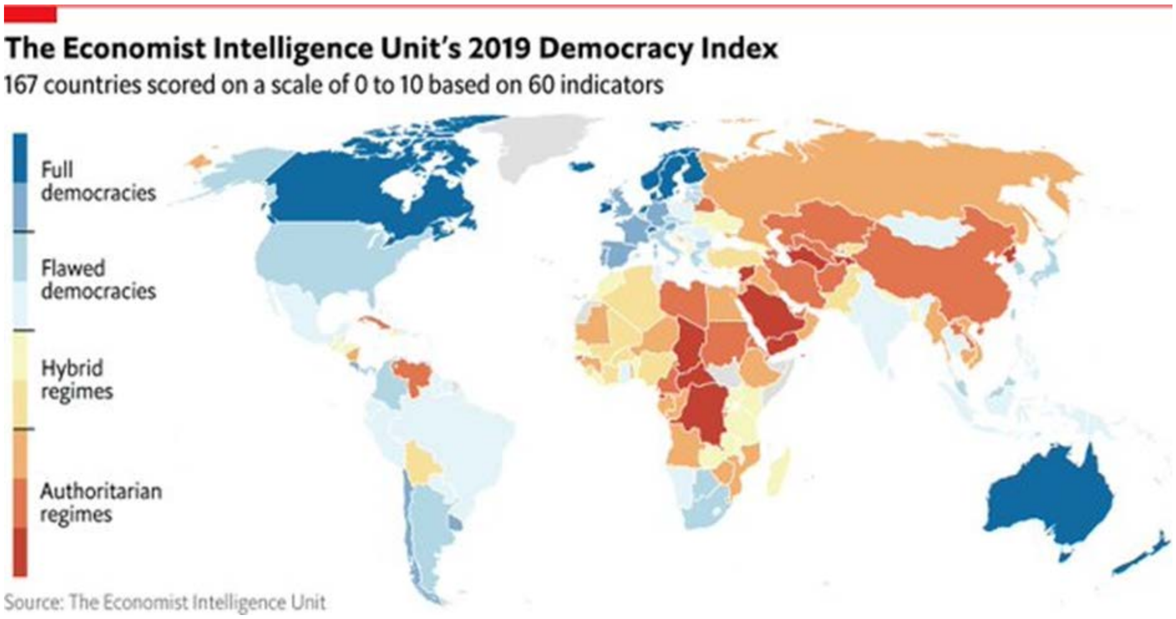

Figure 1.2 Countries Democracy Index

1.4 Exchange Market

For a pure floating regime, without central bank intervention, the exchange market is like any other commodity market, in which demand and supply of a commodity determine its price. If a nation's total demand for a foreign currency exceeds its total foreign exchange earnings, the exchange rate increase; therefore, the local currency will depreciate, and the foreign currency will appreciate. However, in the real world, no currency is free of central bank intervention.

Also essential to the exchange market is inflation, which, in developing countries, is generally demand-side and largely has roots in the excess money supply. Here, the institution of an ‘independent central bank' plays a key role in preventing excess money supply and resultant inflation. However, in many developing countries, central banks are not independent. Therefore, in these countries, governments usually resolve their budget deficit problems easily by ordering their central bank to print money directly or increase their money supply indirectly through other means.

1.5 Oil Rent and Currency Overvaluation

Now imagine a country like Iran, which has between 30% and 58% annual inflation over the past several years. If the Iranian central bank keeps the fixed, dollar-pegged exchange rate year after year, should we expect Iranian currency to be heavily overvalued? Two points are important to consider here: first, natural resources such as oil and gas are under government control in most countries and the oil rent is a vast part of the government's revenue. Therefore, it is very important to consider who has access to the trickle-down of this wealth, which may be a source of government corruption. Secondly, one must consider the overvalued exchange rate. If a country keeps printing money and still defends fixed and pegged exchange rates, this leads to overvaluation and encourages more capital to exit the country. To prevent such capital flight, countries impose restrictions, often giving rise to a black market for foreign currency exchange, although in some cases, such markets exist openly and are tolerated by the government. More currency being overvalued means that the increased oil rent earnings make this resource more lucrative—for those who have access to it. For this reason, the interaction of the variables of oil rent and an overvalued exchange rate can more fully explain the natural resource cures phenomena.

1.6 Data for this Study

At the time of writing, the most current Penn World Table (PWT) was version 9.1, which includes variables data including real GDP, purchasing power parity (PPP), exchange rate, output, consumption, capital formation, and productivity information for 182 countries between 1950 and 2017. For comparison and robustness, data have also been obtained from the Madison Database and World Bank World Development Indicators (WDI). The quality institution's data were obtained from two resources: Freedom House and Polity IV. Data regarding oil exports, reserves, production, and historical prices can be found at the OPEC Oil and Gas Data website[3]. However, at the time of this writing, only data through 2013 was available on that website. OPEC's Data Services Department provided the author with the full database, including data through 2017.

This study also includes an interaction variable in the model. It is oil rent multiplied overvaluation. For robustness, the author collected both oil rent data and total rent data. The latter is the ratio between the total rent on all of a country's natural resources and its GDP. However, in the case of the oil-rich countries included in this study, these data are mainly the total of crude oil and natural gas rent to the country's GDP. Thus, the second interaction variable is either the component of oil rent or total rent concerning the overvaluation data. In the same way, the first interaction variable is either the component of POLITY2 or FH data and oil rent or total rent data.

2. Literature Review

According to Helpman (2004) and Barro and Sala-i-Martin (2004), the study of economic growth can be separated into two 'waves of research.' Although classical economists from Adam Smith to Thomas Malthus, Frank Ramsey, and Joseph Schumpeter discussed the essential elements of economic theories such as the accumulation of physical and human capital, diminishing returns, and technological progress, the first wave began during the 1950s with the neoclassical Solow–Swan model that had the key assumption of exogenous technological progress and the concept of conditional convergence. The focus of the neoclassical growth model was more on explaining the

[3] See https://www.opec.org/library/Annual%20Statistical%20Bulletin/interactive/current/FileZ/Main-Dateien/oilgasdata.html.

short-run growth rate and business cycles. The concept of conditional convergence was achieved by removing the assumption that different countries had the same initial economic positions. Allowing such heterogeneity across countries is the main idea behind different economies growing faster from their steady-state values (Barro and Sala-i-Martin 2004).

The second wave began with the work of Romer (1986) and Lucas (1988) and the realization of the crucial importance of long-run growth over the mechanics of business cycles. Taking steps in this path required linking the per capita growth rate with technological progress that can be defined inside the model. Thus, the most important contribution of the second wave economic growth theories was stating the long-run growth rate within the model, termed endogenous growth models. By introducing research and development (R&D) and imperfect competition into the growth model by Romer (1986, 1990), Aghion and Howitt (2009), and Helpman (2004), technological progress was the result of planned R&D activities, which are rewarded by some type of monopoly. This technological progress through R&D is the engine of long-run economic growth. Hence, the long-run growth depends on the government via taxation, protection of property law, providing infrastructural investment, regulation of the financial market, international trade and so on. Therefore, government and institutions play a key role in long-run economic growth[4].

3. Methodology

This study was conducted in two phases. First, was the determination of currency over or undervaluation in oil-rich countries. In the second phase, overvaluation data attained in phase one

[4] To see the variety of modern economic growth models in more details look at Romer (2001), Barro and Sala-i-Martin (2004), Aghion and Howitt (2009), and Acemoglu (2009).

were used to find the relationship between oil rent-overvaluation and economic growth for oil-rich countries considering their quality of institutions.

3.1 Phase One: Finding Currency Overvaluation

To determine currency overvaluation, two leading papers were considered: Dollar (1992) and Rodrik (2008). In his influential paper, Dollar (1992) showed a way to calculate, what he called, distortion from PPP or the Balassa–Samuelson effect. Although PPP is a widely used theory of exchange rate determination in international economics, Balassa (1964) and Samuelson (1964) independently provided a theoretical model, known today as the Balassa–Samuelson effect, showing that countries with higher incomes have higher technology advances and, therefore, more productive labor on tradable goods than low-income countries. Though, as the 'law of one price' does not work on non-tradable goods, by increasing the wages in non-tradable goods in high-income countries, they have more expensive non-tradable goods compared to low-income countries. Consequently, different productivities lead to a deviation from PPP (Asea and Corden 1994).

From Rodrik (2008), I computed every country's under/overvaluation for the period of this study in three steps. Step 1 used the PWT and divided the exchange rate (XR) by the PPP conversion rate to calculate the RER:

(1) $$\ln RER_{it} = \ln (XR_{it} / PPP_{it})$$

where i is for countries and t is for time. The PWT versions after Version 7 do not directly provide PPP; however, they provide a variables correspondence link that explains how PPP can be calculated as "pl_gdpe" multiple "xr". Both XR and PPP are national currency units per US dollar

(USD). According to the Balassa–Samuelson effect, non-tradable goods are cheaper in less developed countries. In step 2, the RER was adjusted for this effect by regressing lnRER on GDP per capita, using rgdpo (output-side real GDP at chained PPP) divided by population (pop), both obtained from the PWT:

$$\text{(2)} \qquad lnRER_{it} = \alpha + \beta \ln(rgdpo/pop) + f_t + u_i$$

where f_t is the time fixed effect and u_i is the error term. Through robust pooled regression, a very significant β of -0.1125664 was found. Then, by determining the fitted value for each country and year, the Balassa–Samuelson adjusted rate was calculated. In Step 3, the RER was subtracted from the above-adjusted rate:

$$\text{(3)} \qquad LnUNDERVAL_{it} = lnRER_{it} - lnRERfit_{it}$$

According to Rodrik (2008), when UNDERVAL exceeds unity, the currency is undervalued (i.e., imports are expensive, but exports are relatively cheap). When it is below unity, the currency is overvalued (i.e., imports are cheap, and exports are relatively expensive). Thus, to see the relationship between overvaluation and economic growth, Rodrik (2008) used the following equation or estimation model:

$$\text{(4)} \qquad growth = \alpha + \beta\, lnGDPpc_{i,t-1} + \delta\, lnUNDERVAL_{it} + f_i + f_t + u_{it}$$

where GDP per capita annual growth is the dependent variable, f_i and f_t are the relative country and time fixed effect, respectively. The empirical result obtained using STATA. Despite overvaluation is this study's concern, to maintain consistency between this and Rodrik's (2008) model, I kept the variable name "LnUNDERVALit". However, the interpretation of results should be undertaken with care. According to Rodrik (2008), whenever the UNDERVAL was below unity, the currency was overvalued and when it exceeded unity, the currency was undervalued. Figure 3.1 shows how overvaluation and economic growth move together in these selected countries.

Figure 3.2 Overvaluation and economic growth in selected countries

Also, the results of the time-series regressions for selected countries (Table 3.1) and panel data fixed effect for all countries (Table 3.2) all showed a significant positive relationship between currency over/undervaluation and economic growth. This is the expected result as show overvalued currency has a reverse relationship with economic growth. Notice that again when the variable UNDERVAL is below unity, the currency is overvalued and figure 1 shows how growth rate decrease when the currency is overvalued.

A more recent study by Habib, Mileva, and Stracca (2016) confirmed Rodrik's (2008) results, and in particular, emphasized that the RER was a more important factor for economic growth in developing countries than in developed countries. They concluded "a strong and statistically significant positive (negative) effect of real depreciation (appreciation) on real per capita growth…" (Habib et al., 2016).

Table 3.1 <u>Time Series Regression of the Overvaluation in Selected Countries</u>

	Iran	**Indonesia**	**Kuwait**	**Saudi Arabia**	**Nigeria**	**Qatar**
GDP per Capita						
lnUNDERVAL	0.867***	1.355***	1.262***	0.623**	1.991***	2.273***
	(9.77)	(4.55)	(5.52)	(3.45)	(12.90)	(10.39)
_cons	8.876***	7.792***	10.54***	10.10***	8.731***	10.91***
	(84.42)	(84.42)	(128.86)	(151.93)	(88.86)	(209.15)
N	45	45	45	45	45	45
t statistics in parentheses						
* p<0.05, ** p<0.01, *** p<0.001						

Table 3.1 <u>Panel Data Regression of the Overvaluation in all Countries</u>

	All Countries 1970-2014 (1) growth	All Countries 1970-2014 (2) growth	All Countries 1980-2014 (3) growth	All Countries 1980-2014 (4) growth	All Countries† 1990-2014 (5) growth	All Countries† 1990-2014 (6) growth
LnGDPpc_1	-3.682***		-4.890***		-5.851***	
	(-5.75)		(-6.41)		(-5.60)	
LnGDPpc_5		-3.427***		-2.648***		-3.380***
		(-5.81)		(-3.54)		(-3.55)
lnUNDERVAL	4.110***	2.470**	3.585***	2.621**	4.828***	2.755*
	(5.02)	(3.07)	(3.95)	(2.80)	-4.2	-2.51
_cons	36.73***	32.28***	44.73***	24.09***	52.28***	32.93***
	(6.15)	(5.88)	(6.16)	(3.40)	-5.41	-3.74
N	1119	1031	888	788	657	553

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

†Russia is included in models 5 and 6

3.2 Phase Two: Oil Rent and Economic Growth

This study assumes that factors such as institutions, customs, history, and stage of development may be different amongst countries or between cross-sections, as well as that each country's characteristics may evolve over a long period. Some countries may experience shocks such as war or revolution or, in the case of global shock, countries may absorb it differently depending on their levels of resilience as determined by their unique infrastructures and institutions. In other words, in dynamic time-variant macroeconomic models, the heterogeneity may not differ only in each cross-section among countries, which can be easily captured through intercept α_i, but the slope for each country, the coefficient β_i, may also differ over time. For this reason, Pesaran and Smith (1995) showed that none of the FE or RE methods are consistent in this situation. To resolve this bias estimation problem in dynamic panel data with heterogeneous slopes, Pesaran and Smith (1995), Pesaran, Shin, and Smith (1997, 1999), and Im, Pesaran, and Shin (2003) offered two important techniques to estimate non-stationary heterogeneous dynamic panels: the mean group (MG) and the pooled mean group (PMG). Both are a general autoregressive distributed lag (ARDL) model with this difference that in the MG method, both intercepts and slopes can vary across cross-section units, whereas in the PMG method, the intercepts and short-run coefficients can vary; however, the long-run coefficient is assumed to be the same among countries (De Hoyos and Sarafidis 2006; Asteriou and Hall 2016).

A dynamic (ARDL) model with the assumption that all coefficients can vary across cross-sectional units can be written as[5]:

(5) $$Y_{it} = \alpha_i + \gamma_i Y_{t-1} + \beta_i X_{it} + \varepsilon_{it}$$

where i = 1, 2, …, N for countries and t = 1, 2, …, T for time, the long-run parameter for country i is: $\theta_i = \frac{\beta i}{1-\gamma i}$

and the MG estimators for the whole panel will be: $\hat{\theta} = \frac{1}{N} \Sigma \theta_i$ and $\hat{\alpha} = \frac{1}{N} \Sigma \alpha_i$

Nevertheless, as soon as a lag variable is added to the model, autocorrelation between the model's current year and the lag variable is expected. Therefore, the mean and/or variance of a non-stationary time series depends on time (Asteriou and Hall 2016). Identifying non-stationarity in a model is the same as the presence of unit roots in the model. We know that in the simplest AR

[5] Model, based on Asteriou and Hall (2016).

(1) model such as $y_t = \Phi\, y_{t-1} + \varepsilon_t$, only if $\Phi = 1$ will there be a unit-root and the series will be non-stationary. We also know that, at least in this simple case, we can obtain stationarity by first-order differencing, i.e.: $y_t - y_{t-1} = \Phi\,(y_{t-1} - y_{t-1}) + \varepsilon_t \quad => \quad \Delta y_t = \varepsilon_t$

3.2.1 Cointegration

The most macroeconomic variables such as GDP, inflation index (CPI) and money supply are time depended or trended therefore in most cases they are non-stationary as their means are constantly increasing. The problem with trended or non-stationary data is that the OLS estimator can be easily inconsistent and biased[6]. The idea of finding a solution that has both short- and long-run results while at the same time maintaining stationarity among all variables has led scholars to produce a model by combining two accumulated error terms, which are called stochastic trends[7]. In a special case that their combination eliminating non-stationarity, the variables are cointegrated. Nevertheless, when variables are cointegrated, even if they may have increasing trends over time, there should be a common trend that links them together. Therefore, most macroeconomic models either are cointegrated or they suffer spurious regression problem. Hence, cointegration is so important in dynamic macroeconomic models.

3.2.2 Error Correction Model (ECM)

The most popular model that can create cointegrated stationarity is called the ECM, in the simple form of:

(6) $$\Delta Y_t = \alpha_0 + b_1\, \Delta X_t - \pi\, \hat{\mu}_{t-1} + \varepsilon_t$$

[6] For more details, look at Baltagi (2013), Asteriou and Hall (2016) and Nymoen (2019).
[7] Variable is unit-root non-stationary (Nymoen 2019, 316).

where Y_t and X_t have a long-run relationship because $\hat{\mu}_t = Y_t - \hat{\beta}_1 - \hat{\beta}_2 X_t$ and $\hat{\mu}_t \sim I(0)$, and b_1 produces the short-run effect or the immediate impact of a change in X_t on Y_t. The coefficient $\hat{\beta}_2$ produces the long-run relationship between X_t and Y_t through the equation:

(7) $$\hat{\mu}_{t-1} = Y_{t-1} - \hat{\beta}_1 - \hat{\beta}_2 X_{t-1}$$

and π is the adjustment effect that shows how much disequilibrium has been corrected. In general, this process is similar to the re-parametrization of the linear ARDL.

Thus, the multivariable dynamic ARDL model for the present study, is as follows[8]:

(8) $$Y_{it} = \sum_{j=1}^{p} \gamma_{ij} Y_{i,t-j} + \sum_{j=0}^{q} \beta'_{ij} X_{i,t-j} + \mu_i + \varepsilon_{it}$$

where, t = 1, 2, …, T is for the time periods, I = 1, 2, …, N is for the countries, Y_{it} is economic growth, and $X_{i,t-j}$ is the vector (kx1) of explanatory variables for the countries. For the explanatory variables, j begins from zero instead of one to allow the inclusion of the current year (time t) for explanatory variables in the model. Furthermore, μ_i is the fixed effect and ε_{it} is the error term iid ~ $(0, \sigma^2)$. Then, the above model can be reparametrized as an ECM:

(9) $$\Delta Y_{it} = \theta_i(Y_{i,t-1} - \varphi'_i X_{i,t-1}) + \sum_{j=1}^{p} \gamma_{ij} \Delta Y_{i,t-j} + \sum_{j=0}^{q} \beta'_{ij} \Delta X_{i,t-j} + \mu_i + \varepsilon_{it}$$

(10) $$\theta_i = -(1 - \sum_{j=1}^{p} \gamma_{ij});$$

(11) $$\varphi'_i = \sum_{j=0}^{q} \beta'_{ij} / (1 - \sum_k \gamma_{ik});$$

where, θ_i is the error correction parameter at the equilibrium and φ_i is the long-run parameter if we use the MG estimator. When using the PMG estimator, because the long-run coefficient will be

[8] The model adapted based on Asteriou and Hall (2016).

the same across countries, we have φ' instead of φ_i. An important feature of the ECM is its multicollinearity reduction by combining differenced data with lagged levels of variables (Nymoen 2019). Then, based on Apergis and Payne (2014), Cavalcanti et al. (2011), and Mehlum et al. (2006) the following econometric empirical model was developed:

(13) $$\ln y_{j,t} = a_j + d_{j,t} + \beta_{j1} \ln OR_{j,t} + \beta_{j2} \ln Ov_{j,t} + \beta_{j3} \ln IQ_{j,t} + \mu_{j,t}$$

where, $\ln y_{j,t}$ is the logarithm of GDP per capita for countries j = 1,…, J and time period t = 1, …, T, a_j represents country-specific fixed effects and $d_{j,t}$ denotes heterogeneous country-specific trends. $OR_{j,t}$ is the oil rent, $Ov_{j,t}$ is the currency overvaluation, and $IQ_{j,t}$ is quality of the institutions. Then, the ECM form of the above model is as follows:

(14) $$\Delta \ln y_{j,t} = \gamma_j + \varphi\, \Theta_{j1}\, \omega_{j,t-1} + \sum_{j=1}^{p-1} \theta_{j2}\ \Delta\omega_{j,t-1} + \mu_{j,t}$$

where (15) $$\omega_{j,t-1} = \ln y_{j,t-1} + \beta_{j1} \ln OR_{j,t} + \beta_{j2} \ln Ov_{j,t} + \beta_{j3} \ln IQ_{j,t}$$

4. Empirical Results

Table 4.1 presents the results of the Granger causality test to determine whether there was any simultaneous effect between overvaluation and the GDP per capita.

Table 4.1 <u>Dumitrescu Hurlin Panel Causality Test</u>

Null Hypothesis:	Z Statistics	P-Value
LNOVER does not cause LGDP	2.858	0.0043
LGDP does not cause LNOVER	1.667	0.0955

The null hypothesis states there is no causal relationship between the two variables. Because the above result shows only a causality relationship between overvaluation and GDP per capita, the ARDL model instead of a panel vector autoregressive (PVAR) model has been used in this study. The ARDL model works well when variables are cointegrated and the reduced form as an ECM established. The following IPS unit-root test shows that the variables were stationary at first difference level, as such they are integrated one; I (1) (Table 4.2). In this analysis, although the standard augmented Dickey-Fuller (ADF) test on the regression residuals with a null hypothesis that the variables are not cointegrated, and an alternative hypothesis that they are cointegrated can do the job, the Pedroni test for cointegration and the Im–Pesaran–Shin (IPS) unit-root test considers heterogeneity in different sections of the panel data and across the error terms.

Table 4.2 Variables IPS Stationary, Unit-Root Test

Variable	Level Form	First Difference
Real GDP Per Capita	-0.72	-28.16***
Overvaluation	-0.81	-23.004***
Oil Rent*Overvaluation	-1.4277	-5.5627***

***, **, *, Statistically significant at 1%, 5%, 10% respectively

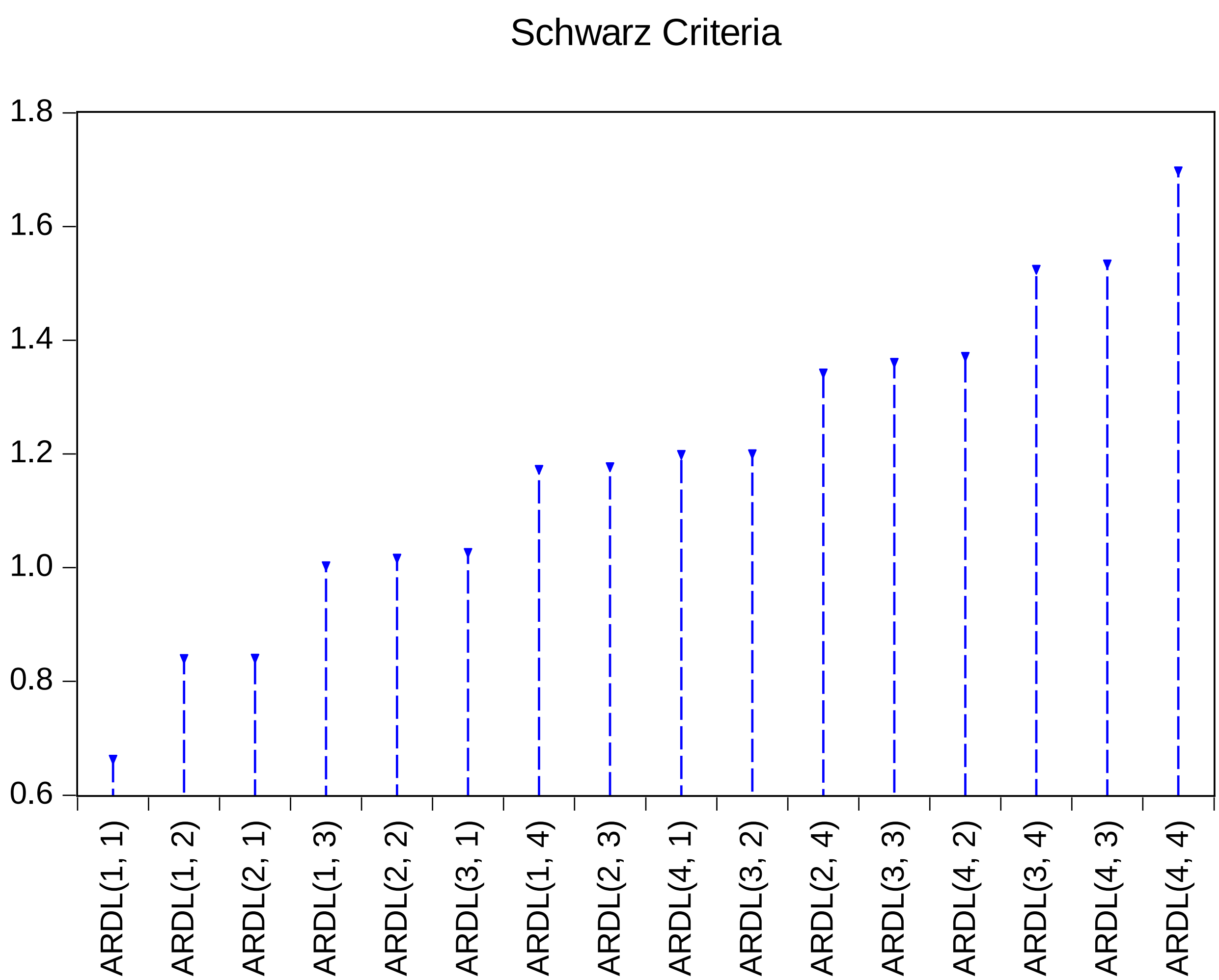

Figure 4.1 Schwarz criteria

To ensure the best number of lags in the model, Schwartz criteria are used, which indicates that ARDL (1,1) works best in this study (Figure 4.1).

Finally, using the MG regression estimators, in three scenarios for all 26 countries from 1980 to 2017, countries with strong institution quality, and countries with weak institution quality. In the first scenario, GDP per capita was the dependent variable and overvaluation was the independent variable. Several other controlling variables that are typical growth models literature variables, such as human capital and capital formation, were considered in the empirical regression model. As Table 4.3 shows, the long-run coefficient of overvaluation, θ, is significant and negative, as expected. This indicates a reverse relationship between overvaluation and economic growth. The short-run coefficient, β, is not significant in this empirical model. The error correction coefficient, γ, is the adjustment coefficient. Finally, the FH institution quality was entered as a fixed variable because it did not have enough variation for the period of this study.

Table 4.3 <u>MG Estimation for All Countries 1980-2017 LNOVER on LGDP</u>

	Coefficient	t Statistics	St. D.	P-Value
		Long-Run		
θ	-1.0019	0.1601	6.2557	0.000
		Short-Run		
γ	-0.058	0.016	3.631	0.000
β	0.069	0.125	0.558	0.576
FH	0.258	0.098	2.620	0.008

We should be careful about how we interpret the FH coefficient. Freedom House ranks countries from 1 to 7, where 1 specifies the best and healthiest quality of institutions in a country and 7 displays the worst condition. Thus, as the FH variable decreases, the quality of institutions in a country improves. Consequently, the negative sign of the FH coefficient should be considered as a positive relationship between the quality of institutions and economic growth, as expected. Because FH is a fixed variable in the model, there is only a short-run coefficient available for it. Hence, for all countries, FH in the short run is positive and significant.

Table 4.4 <u>MG Estimation; GDP per capita and Interaction Variable 1980–2017</u>

	Strong Institutions	Weak Institutions
Variables	Coefficient	Coefficient
	Long-Run	
OilRent-Overvalued	0.058*	-0.41**
	(0.082)	(0.095)
	Short-Run	
EC	-0.05***	-0.007**
	(0.015)	(0.025)
D (LnOR-Over)	0.42	0.038
	(0.034)	(0.073)
FH	-0.0226*	-0.325*
	(0.118)	(0.141)

In the second and third scenarios, the independent variable is an interaction variable, oil rent multiplied by overvaluation. This interaction variable alongside several other controlling variables was considered in the empirical model. In the second scenario, these variables were estimated for countries with a strong quality of institutions and in the third scenario for countries with weak quality of institutions. More details about these countries can be found in the Appendix.

Table 4.4 provides the results of these scenarios. As expected, the combination of oil rent and overvaluation created a variable that allows us to better measure the effect of oil rent and overvaluation on economic growth. Furthermore, the distinction among countries with weak and robust quality of institutions enables us to examine how institutions can influence this process. The significant negative long-run relationship between OilRent-Overvaluation and economic growth in countries with weak institutions and positive coefficient for countries with strong institutions while the coefficient for the FH institution variable is positive and significant for both groups of countries, support the theory that rent-seeking behavior and currency overvaluation can hurt the steady economic growth process in oil-rich countries with weak institutions in the long-run.

Table 4.5 shows the short-run coefficients for selected countries. Although, as discussed short-run coefficients are not very important in macroeconomics study, we can see some different impacts of interaction and institution quality variables on these selected countries. The first country, Australia, is a country with strong institution quality and in this regression model, the coefficient of the FH variable is not significant. However, for the next country, Iran, with weak institution quality the FH coefficient is positive and significant. The results for other countries in table 4.5 either are not significant or have mixed coefficient signs. As mentioned, the important is the long-run relationship between these variables. In general, we expect a more influential role of political and economic institutions, such as an independent judiciary system, protection of property law, and independent central banks, in developing countries than developed countries.

5. Conclusion

Given the results of this study, the present research puts forward three contentions. First, while some scholars argue that investigations into resource abundance (as measured by resource reserves) or resource dependence (as measured by the percentage of resource export to the GDP) should be considered, this study argues that resource dependence is a better explanatory variable for such research. If the purpose of the study is to determine the influence of resource rent, in this case, oil, on economic growth, then it is not clear how resource reserves, which are underground, and yet unused, can be an effective explanatory variable. As part of a nation's wealth, resource reserves can play a role of endowment on the nation's initial stage of growth for the conditional convergence purposes in the neoclassical growth model, but not necessarily on the nation's dynamic economic growth rate after the initial step. Moreover, OPEC members use their most updated oil reserves to bargain their production quota and market share. The biggest concern with choosing resource reserves over resource exports is an endogeneity problem in the model. While resource reserves are typically assumed to be exogenous in the model, the percentage of resource export to the GDP is endogenous in such a model (Brunnschweilera and Bulte 2008). However, MG/PMG and PVAR techniques can address this issue in their models (Antonakakis, Cunado, Filis and Perez de Garcia 2017).

Second, the results of this study suggest that the welfare effect of natural resources could be very different from the growth effect. The results of this study indicate that oil-rich countries may have a good welfare policy by overvaluing their currency to make imported necessities cheaper for their citizens, but such a welfare policy may not be an excellent economic growth policy. Moreover, as the scholars (Boschini et al. 2007; Durlauf, Johnson, & Temple 2005; Isham et al. 2005; Ross 2005) suggest, and this study used as its foundation, crude oil is by far the most significant natural resource that can undesirably affect economic growth, for countries with weak institutions.

Third, this study contends that in oil-rich developing countries with weak institutions, rent-seeking behavior and currency overvaluation slow economic growth. Indeed, this study confirms that oil rent has a substantial adverse effect on economic growth in the case of countries with weak institutions. For these countries, the interaction of such rent with overvaluation is even more negatively significant. As Arezki and Van der Ploeg (2007) suggested, higher natural resource revenue is an open invitation to rent-seeking activities.

Despite the fact that this study's main objective was to investigate the role of currency overvaluation and oil rent on the economic growth of oil-rich countries, it is also essential to consider sustainable growth in developing countries beyond the standard growth components such as the efficient allocation of scarce resources, capital accumulation, incomes, and output. Any scrutiny of economic growth in developing countries must consider the stage of economic development in those countries and development features, such as Kuznets's structural change and urbanization process (Acemoglu 2009). Further, economic development is more than improvements in incomes and output and typically involves radical changes in institutions and social structures as well as customs and beliefs (Todaro and Smith 2012).

REFERENCES

Acemoglu. 2009. *Introduction to Modern Economic Growth.* Princeton and Oxford: Princeton University Press.

Acemoglu, Daron, and James Robinson. 2006. "Economic Backwardness in Political Perspective." *American Political Science Review, Vol. 100, No. 1* 115-131.

Acemoglu, Daron, Simon Johnson, and James A. Robinson. 2001. "An African Success Story: Botswana." *SSRN.*

Acemoglu, Daron, Simon Johnson, and James A. Robinson. 2005. "Institutions as a Fundamental Cause of Long-Run Growth." In *Handbook of Economic Growth, Volume IA. Edited,* by Philippe Aghion and Steven N. Durlauf. Elsevier B.V.

Aghion, Philippe, and Peter Howitt. 2009. *The Economics of Growth.* Cambridge: The MIP Press.

Antonakakis, Nikolaos, Juncal Cunado, George Filis, and Fernando Perez de Garcia. 2017. "Oil dependence, quality of political institutions, and economic growth: A panel VAR approach." *Resources Policy* 147-163.

Apergis, Nicholas, and James E Payne. 2014. "The oil Curse, institutional quality, and growth in MENA countries: Evidence from time-varying cointegration." *Energy Economics 46* 1-9.

Arezki, Rabah, and Frederick Van der Ploeg. 2007. "Can the Natural Resource Curse Be Turned Into a Blessing? The Role of Trade Policies and Institutions." *IMF Working Paper.*

Asea, Patrick K., and W. Max Corden. 1994. "The Balassa-Samuelson Model: An Overview." *Review of International Economics* Working Paper 710.

Aslaksen, Silje. 2008. "Corruption and Oil: Evidence from Panel Data." The *University of Oslo.*

Asteriou, Dimitrios, and Stephen G. Hall. 2016. *Applied Econometrics Third Edition.* London: MacMillan Education Palgrave.

Ayad, Hicham, and Mostéfa Bel. 2017. "Financial development, trade openness and economic growth in MENA countries." *Theoretical and Applied Economics* 233-246.

Balassa, Bela. 1964. "The Purchasing-Power Parity Doctrine: A Reappraisal." *Journal of Political Economy, Vol. 72, No. 6* 584-596.

Baldwin, Robert E. 1966. *Economic Development and Export Growth: A Study of Northern Rhodesia, 1920–1960.* Oakland: University of California Berkeley Press.

Baltagi, Badi H. 2013. *Econometric Analysis of Panel Data Fifth Edition.* West Sussex: Wiley.

Barro, Robert J., and Xavier Sala-i-Martin. 2004. *Economic Growth.* Cambridge: The MIT Press.

Berg, Andrew, and Yanliang Miao. 2010. "The Real Exchange Rate and Growth Revisited: The Washington Consensus Strikes Back?" *IMF Working Paper.*

Bhalla, Surjit S. 2008. "Economic Development and the Role of Currency Undervaluation." *Cato Journal, Vol. 28, No. 2* 313-340.

Bhattacharyy, Sambit, and Roland Hodler. 2010. "Natural resources, democracy, and corruption." *European Economic Review 54* 608–621.

Boschini, Anne, Jan Pettersson, and Jespe Roine. 2007. "Resource Curse or Not: A Question of Appropriability." *The Scandinavian Journal of Economics, Vol. 109, No. 3* 593-617.

Boschini, Anne, Jan Pettersson, and Jesper Roine. 2012. "The Resource Curse and its Potential Reversal." *Elsevier World Development.*

Broz, Lawrence, and Jeffry Frieden. 2006. "The Political Economy of Exchange Rates." In *Handbook of Political Science*. Delhi: Weingast.

Brunnschweilera, Christa N., and Erwin H. Bulte. 2008. "The resource curse revisited and revised: A tale of paradoxes and red herrings." *Journal of Environmental Economics and Management 55* 248–264.

Cavalcanti, Tiago, Kamiar Mohaddes, and Mehdi Raissi. 2011. "Growth, development and natural resources: New evidence using a heterogeneous panel analysis." *The Quarterly Review of Economics and Finance* 305-318.

Chang, Roberto, Linda Kaltani, and Norman V. Loayza. 2009. "Openness can be good for growth: The role of policy complementarities." *Journal of Development Economics* 33-49.

Conrad, Daren, and Jaymieon Jagessar. 2018. "Real Exchange Rate Misalignment and Economic Growth: The Case of Trinidad and Tobago." *Economies MDPI* Economies 2018, 6, 52; doi:10.3390/economies6040052. https://www.mdpi.com/journal/economies.

Davies, Norman. 1996. *Europe A History.* Oxford: Oxford University Press.

De Hoyos, Rafael E., and Vasilis Sarafidis. 2006. "Testing for cross-sectional dependence in panel-data models." *The Stata Journal* 482–496.

Deluna, Roperto Jr, and Antiquisa Chelly. 2014. "Economic Growth, Financial and Trade Globalization in the Philippines." *MPRA Paper* No. 60206.

Dollar, David. 1992. "Outward-Oriented Developing Economies Really Do Grow More Rapidly: Evidence from 95 LDC's 1976-1985." *Economic Development and Cultural Change* 523-544.

Dunn, Robert M. Jr., and James C. Ingram. 1996. *International Economics.* New York: John Wiley & Sons, Inc.

Durlauf, Steven N., Paul A. Johnson, and Jonathan R.W. Temple. 2005. "Growth Econometrics." In *Hand Book of Economic Growth, Vol. 1A*, by Philippe Aghion and Steven N. Durlauf, chapter 8 555-677. Amsterdam: Elsevier.

Esfahani, H.S. 1991. "Exports, Imports and Economic Growth in Semi-Industrialized Countries." *Journal of Development Economics* 93-116.

Feenstra, Robert C. 2016. *Advanced International Trade.* Princeton: Princton University Press.

—. 2016. *Advanced International Trade Second Edition.* Princeton and Oxford: Princeton University Press.

Fetahi-Vehapia, Merale, Luljeta Sadikub, and Mihail Petkovskic. 2015. "Empirical Analysis of the Effects of Trade Openness on Economic Growth." *Procedia Economics and Finance* 17 – 26.

Francine Gaelle, Djouedjom Talla, Zhao Xicang, and Akowuah. Isaac Newton. 2018. "Renewable Energy Consumption and Economic Growth Nexus in the Central African Sub-Region: Application of Panel Cointegration Approach." *Journal of Economics and Sustainable Development.*

Frieden, Jeffry. 2008. "Globalization and exchange rate policy." In *The Future of Globalization*, by Ernesto Zedillo, 344-357. New York: Routledge.

Gala, Paulo. 2008. "Real exchange rate levels and economic development: theoretical analysis and econometric evidence ." *Cambridge Journal of Economics, Volume 32, Issue 2* 273–288.

Gala, Paulo, and Claudio R. Lucinda. 2006. "Exchange Rate Misalignment and Growth: Old and New Econometric Evidence." *Economia, Bras´ılia (DF), Vol. 7, No. 4* 165–187.

Gao, Jiti, Kai Xia, and Huanjun Zhu. 2018. "Heterogeneous Panel Data Models with Cross-Sectional Dependence." *Monash University, Australia and Xiamen University, China.*

Gelb, Alan H. 1988. *Oil Windfalls: Blessing Or Curse?* London: Oxford University Press.

Grossman, Gene M., and Elhanan Helpman. 1991. *Innovation and Growth in the Global Economy.* Cambridge: The MIT Press.

Gylfason, Thorvaldur, Tryggvi Thor Herbertsson, and Gvlfi Zoeca. 1999. "A Mixed Blessing Natural Resources and Economic Growth." *Macroeconomics Dynamicks 3* 204-225.

Habib, Maurizio Michael, Elitza Mileva, and Livio Stracca. 2016. "The Real Exchange rate and economic growth: revisiting the case using external instruments." *European Central Bank Working Paper Series.*

Harford, Tim, and Michael Klein. 2005. "Aid and the Resource Curse." *The World Bank Group, Public Policy for Private Sector, Note Number 291.*

Harvey, David I., Neil M. Kellard, Jakob B. Madsen, and Mark E. Wohar. 2008. "The Prebisch-Singer Hypothesis: Four Centuries of Evidence." *The MIT Press Journal.*

Helpman, Elhanan. 2004. *The Mystery of Economic Growth.* Cambridge: The Belknap Press of Havard University Press.

Hirschman, Albert O. 1958. *The strategy of economic development.* New Haven: Yale University Press.

Hsiao, Cheng. 2014. *Analysis of Panel Data.* New York: Cambridge University Press.

Husted, Steven, and Michael Melvin. 2001. *International Economics.* Boston: Addison Westley.

Im, K., H. Pesaran, and Shin Y. 2003. "A Simple Panel Unit Root Test in the Presence of Cross Section Dependence." *Journal of Econometrics, 115* 53-74.

Isham, Jonathan, Michael Woolcock, Pritchett Lant, and Gwen Busby. 2005. "The Varieties of Resource Experience: Natural Resource Export Structures and the Political Economy of Economic Growth." *The World Bank Economic Review, Vol. 19, No. 2* 141-174.

Islam, Nazrul. 1995. "Growth Empirics: A Panel Data Approach." *The Quarterly Journal of Economics, Vol. 110, No. 4* 1127-1170.

Johnson, Simon, Jonathan D. Ostry, and Arvind Subramanian. 2006. "Levers for Growth." *Finance and Development, IMF, Vol. 43, No. 1.*

Juselius, Katarina. 2006. *The Cointegrated VAR Model: Methodology and Applications.* Oxford, UK: Oxford University Press.

Kaminsky, Graciela L., and Carmen M. Reinhat. 1999. "The Twin Crises: The Causes of Banking and Balance of Payments Problem ." *The American Economic Review, Vol. 89, No. 3* 473-500.

Klein, Michael W., and Jay C. Shambaugh. 2004. "Fixed Exchange Rates and Trade." *NBER, Working Paper 10696.*

Korinek, Anton, and Luis Serven. 2010. "Undervaluation through Foreign Reserve Accumulation Static Losses, Dynamic Gains." *Policy Research Working Paper 5250.*

Krugman. 1979. "A Model of Balance-of-Payments Crises." *Journal of Money, Credit, and Banking, Vol. 11, No. 3* 311-325.

Krugman. 1987. "Is Free Trade Passe?" *JOURNAL OF ECONOMIC PERSPECTIVES VOL. 1, NO. 2* 131-144.

Krugman, Paul R., Maurice Obstfeld, and Marc J. Melitz. 2015. *International Economics Theory & Policy.* Boston: Pearson.

Krugman, R, and P Helpman. 1985. *Market Structure and Foreign Trade.* MIT Press.

Landreth, Harry, and David C. Colander. 2002. *History of Economic Thought.* Boston: Houghton Mifflin Company.

Lane, Philip R., and Aaron Tornell. 1996. "Power, Growth, and the Voracity Effect." *Journal of Economic Growth, Vol. 1, No. 2* 213-241.

Levine, Ross. 1997. "Financial Development and Economic Growth: Views and Agenda." *Journal of Economic Literature* 688-726.

Lewis, Bernard. 1995. *The Middle East.* New York: Scribner.

Lucas, R. E. 1988. "On the Mechanics of Economic Development." *Journal of Monetary Economics* 3-42.

Mankiw, Gergory. 2000. *Macroeconomics.* New York: Worth Publishers.

Mbaye, Samba. 2013. "Currency Undervaluation and Growth: Is there a Productivity Channel?" *MPRA Paper No. 44261.*

Mehlum, Halvor, Karl Moene, and Ragnar Torvik. 2006. "INSTITUTIONS AND THE RESOURCE CURSE." *The Economic Journal, 116* 1-20.

Mussa, Michael. 1984. "The Theory of Exchange Rate Determination." In *Exchange Rate Theory and Practice*, by John F. O. Bilson and Richard C. Marston, 13 - 78. University of Chicago Press.

Nasreen, Samia, and Sofia Anwar. 2014. "Causal relationship between trade openness, economic growth, and energy consumption: A panel data analysis of Asian countries." *Energy Policy* 82-91.

Nicita, Alessandro. 2013. "Exchange Rates, International Trade and Trade Policy." *UNCTAD.*

Nymoen, Ragnar. 2019. *Dynamic Econometrics for Empirical Macroeconomic Modelling.* London: World Scientific.

Olsen, Oystein. 1994. "Macroeconomic Responses to Oil Price Increases and Decreases in Seven OECD Countries." *The Energy Journal vol. 15, No. 4* 19-36.

Pack, Howard. 1994. "Endogenous Growth Theory: Intellectual Appeal and Empirical Shortcomings." *Journal of Economic Perspectives* 55–72.

Pesaran. 2015. *TIME SERIES AND PANEL DATA ECONOMETRICS.* Oxford, UK: Oxford University Press.

Pesaran, M Hashem, and Ron Smith. 1995. "Estimating long-run relationships from dynamic heterogeneous panels." *Journal of Econometrics.*

Pesaran, M. H., Y. Shin, and R. P. Smith. 1997. "Estimating long-run relationships in dynamic heterogeneous panels." *DAE Working Papers Amalgamated Series 9721.*

Pesaran, M. H., Y. Shin, and R. Smith. 1999. "Pooled Mean Group Estimation of Dynamic Heterogeneous Panels." *Journal of the American Statistical Association* 621-634.

Pesaran, M. Hashem. 2006. "Estimation and Inference in Large Heterogeneous Panels with a Multifactor Error Structure." *CESifo Working Paper Series 133.*

Pesaran, M. Hashem. 2004. "General Diagnostic Tests for Cross Section Dependence in Panels." *IZA DP No. 1240.*

Prebisch, Raul. 1950. "The economic development of Latin America and its principal problems." Edited by Translated by GUSTAVO MARTINEZ CABANAS. *UNITED NATIONS PUBLICATION UNITED NATIONS DEPARTMENT OF ECONOMIC AFFAIRS* (UNITED NATIONS PUBLICATION).

Pugel, Thomas A. 2016. *International Economics sixteenth Edition.* New York: McGraw-Hill Education.

Qureshi, Mahvash Saeed, and Charalambos Tsangarides. 2010. "The Empirics of Exchange Rate Regimes and Trade: Words vs. Deeds." *IMF Working Paper WP/10/48.*

Rajan, Raghuram G., and Arvind Subramanian. 2009. "Aid, Dutch Disease, and Manufacturing Growth." *Journal of Development Economics.*

Ravenhill, John. 2005. *Global Political Economy.* Oxford: Oxford University Press.

Rebelo, Sergio T. 1991. "Long-Run Policy Analysis and Long-Run Growth." *The Journal of Political Economy, Vol. 99, No. 3* 500-521.

Robinson, James A., Ragnar Torvik, and Thierry Verdier. 2006. "Political foundations of the resource curse." *Journal of Development Economics 79* 447–468.

Rodrik, Dani. 2008. "The Real Exchange Rate and Economic Growth." *Brookings Papers on Economic Activity* 365-412.

Rodrik, Dani. 1999. "Where Did All the Growth Go? External Shocks, Social Conflict, and Growth Collapses." *Journal of Economic Growth, Vol. 4, No. 4* 385-412.

Romer, David. 2001. *Advanced Macroeconomics second edition.* New York: McGraw-Hill.

Romer, Paul M. 1990. "Endogenous Technological Change." *Journal of Political Economy, 1990, vol. 98, no. 5,.*

Romer, Paul M. 1986. "Increasing Returns and Long-Run Growth." *The Journal of Political Economy, Vol. 94, No. 5* 1002-1037.

Romer, Paul. 2016. "The Trouble With Macroeconomics." *Commons Memorial Lecture of the Omicron Delta Epsilon Society.*

Roquez-Diaz, Adolfo, and Lorenzo Escot. 2018. "Relationship between trade openness and economic growth in Latin America: Acausality Analysis with Heterogeneous Panel Data." *Wiley Online Library* 658-684.

Ross, Michael L. 2001. "Does Oil Hinder Democracy?" *World Politics, Vol. 53, No. 3* 325-361.

Ross, Michael L. 2012. *The Oil Curse How Petroleum Wealth Shapes the Development of Nations.* Princeton: Princeton University Press.

Sachs, Jeffrey, and Andrew Warner. 1995. "Natural resource abundance and economic growth." *NBER Working Paper 5398, National Bureau of Economic Research.*

Sadorsky, Perry. 2011. "Trade and energy consumption in the Middle East." *Energy Economics* 739-749.

Sala-i-Martin, Xavier, and Arvind Subramanian. 2003. "Addressing the Natural Resource Curse: An Illustration from Nigeria." *National Bureau of Economic Research (NBER) Working Paper* Working paper 9804. http://www.nber.org/papers/w9804.

Salvatore, Dominick. 2012. *Introduction to International Economics.* New York: Wiley.

Samuelson, Paul A. 1964. "Theoretical Notes on Trade Problems." *The Review of Economics and Statistics, Vol. 46, No. 2* 145-154.

Schumpeter, Joseph A. 1934. *The Theory of Economic Development.* New Brunswick: Transaction Publishers.

Seers, Dudley. 1964. "The mechanism of an open petroleum economy." *Social and Economic Studies, Vol. 13, No. 2* 233-242.

Sen, Amartya. 1999. *Development as Freedom.* Oxford: Oxford University Press.

Sen, Amartya. 2005. "The Three R's of Reform." *Economic and Political Weekly, Vol. 40, No. 19* 1971-1974.

Shatz, Howard J., and David G. Tarr. 2016. "Exchange Rate Overvaluation and Trade Protection: Lessons from Experience." *World Bank Policy Research Working Paper No. 2289.*

Singer, Hans. 1950. "Comments to the terms of trade and economic development." *Review of Economics and Statistics 40* 84-89.

Stiglitz, Joseph E. 2013. *The Price of Inequality: how today's divided society endangers our future.* New York: W. W. Northon & Company.

Summers, Lawrence H. 1991. "The Scientific Illusion in Empirical Macroeconomics." *The Scandinavian Journal of Economics, Vol. 93, No. 2.* 129-148.

Todaro, Michael P, and Stephen C Smith. 2012. *Economic Development.* Boston: Addison-Wesley.

Tornell, Aaron, and Philip R. Lane. 1998. "Are windfalls a curse? A non-representative agent model of the current account." *Journal of International Economics 44* 83–112.

Van der Ploeg, Frederick, and Steven Poelhekke. 2010. "The Pungent Smell of Red Herrings: Subsoil assets, rents, volatility, and the resource curse." *Journal of Environmental Economics and Management, vol. 60, issue 1* 44-55.

APPENDIX

Table A.1 World Crude Oil Exports (1000 b/d)

World Crude Oil Exporters (1000 barrel/daily)

Rank	Country	crude oil exports 2013	Fuel exports Ave 2010-18 %
1	Saudi Arabia	7,571	73.74
2	Russia	4,710	62.88
3	United Arab Emirates	2,701	40.06
4	Iraq	2,390	99.84
5	Nigeria	2,193	90.13
6	Kuwait	2,058	92.12
7	Canada	2,018	25.06
8	Venezuela	1,937	89.26
9	Angola	1,669	96.36
10	Mexico	1,271	10.16
11	Iran	1,215	69.80
12	Norway	1,198	62.81
13	Oman	838	75.01
14	Algeria	744	95.87
15	Qatar	599	87.73
16	United Kingdom	595	10.66
17	Ecuador	388	47.76
18	Columbia	367	61.82
19	Indonesia	316	27.30
20	Malaysia	263	17.90
21	Gabon	208	83.41
22	Australia	205	28.60
23	Congo	153	67.79
24	United States	119	10.01
25	Brunei	115	93.51
26	Egypt	97	25.01
27	Trinidad and Tobago	65	58.55

Source: OPEC for column 3 and WDI for column 4

Table A.1 **OPEC Current Members Ordered by Membership Date; 2018**

		OPEC Current member Countries; Fact Data 2018							
		Countries	**Capital**	**Membership Date**	**Population million**	**GDP per capita ($)**	**Value of petroleum exports (million $)**	**Proven crude oil reserves (million barrels)**	**Crude oil exports (1,000 b/d)**
Founders	1	Iran	Tehran	1960	82.01	5,104	60,198	155,600	1,849.60
	2	Iraq	Baghdad	1960	38.12	5,571	68,192	145,019	3,862.00
	3	Kuwait	Kuwait City	1960	4.62	30,661	58,393	101,500	2,050.00
	4	Saudi Arabia	Riyadh	1960	33.41	23,418	194,358	267,026	7,371.50
	5	Venezuela	Caracas	1960	31.84	3,093	34,674	302,809	1,273.10
	6	Libya	Tripoli	1962	6.56	7,574	17,141	48,363	998.50
	7	United Arab Emirates	Abu Dhabi	1967	10.14	40,859	74,940	97,800	2,296.50
	8	Algeria	Algiers	1969	42.58	4,186	26,092	12,200	571
	9	Nigeria	Abuja	1971	202.99	2,056	54,513	36,972	1,979.50
	10	Ecuador	Quito	1973	17.02	6,094	9,832	8,273	371
	11	Gabon	Libreville	1975	1.97	4,218	6,510	2,000	174.1
	12	Angola	Luanda	2007	29.25	3,390	36,323	8,160	1,420.60
	13	Equatorial Guinea	Malabo	2017	1.31	8,263	5,492	1,100	145
	14	Congo	Brazzaville	2018	5.4	1,882	4,455	2,982	307.1
		OPEC Total			507.22	146,369	651,113	1,189,804	24,670
	Source: OPEC Database								

Table A.4 <u>Countries in the Study</u>

ID	Code	Country Name	Strong Institutions	All Years Average Polity2	OPEC Members	Year of Membership
1	AGO	Angola		-4	**	1969
2	ARE	United Arab Emirates		-8	**	1967
3	AUS	Australia	*	10		
4	BRN	Brunei		-7		
5	CAN	Canada	*	10		
6	COG	Congo		-4	**	2018
7	COL	Colombia		6		
8	DZA	Algeria		-3	**	2007
9	ECU	Ecuador		7	**	1973
10	EGY	Egypt		-5		
11	GAB	Gabon		-4	**	1975
12	GBR	United Kingdom	*	10		
13	IDN	Indonesia		0		
14	IRN	Iran		-4	**	1960
15	IRQ	Iraq		-5	**	1960
16	KWT	Kuwait		-8	**	1960
17	MEX	Mexico	*	4		
18	MYS	Malaysia		4		
19	NGA	Nigeria		1	**	1971
20	NOR	Norway	*	10		
21	OMN	Oman		-9		
22	QAT	Qatar		-10		
23	SAU	Saudi Arabia		-10	**	1960
24	TTO	Trinidad and Tobago	*	9		
25	USA	United States	*	10		
26	VEN	Venezuela		6	**	1960

*: Countries with strong Institutions. **: OPEC Members

Table A.5 Cross-Sectional Short-Run Overvaluation and Institution for Selected Countries

Cross-Section Short-Run - Australia				
	Coefficient	t Statistics	St. D.	P-Value
COINTEQ01	-0.08312	0.003411	-24.36981	0.0002
D(LnOver)	-0.23026	0.085204	-2.702454	0.0736
FH	1.267828	0.774246	1.6375	0.2001
Cross-Section Short-Run - Iran				
	Coefficient	t Statistics	St. D.	P-Value
COINTEQ01	0.009604	0.000124	77.3998	0.0000
D(LnOver)	-0.072893	0.008814	-8.270554	0.0037
FH	-0.013275	0.000509	-26.05599	0.0001

Cross-Section Short-Run - Iraq				
	Coefficient	t Statistics	St. D.	P-Value
COINTEQ01	0.00039	0.0000122	31.88819	0.0001
D(LnOver)	-0.012337	0.000493	-25.00558	0.0001
FH	0.00295	0.0000944	31.26228	0.0001
Cross-Section Short-Run - Kuwait				
	Coefficient	t Statistics	St. D.	P-Value
COINTEQ01	-0.003505	0.001721	-2.036919	0.1344
D(LnOver)	0.062134	1.587046	0.039151	0.9712
FH	-0.001548	0.00831	-0.186249	0.8641
Cross-Section Short-Run - Nigeria				
	Coefficient	t Statistics	St. D.	P-Value
COINTEQ01	-0.03016	0.000844	-35.72028	0.0000
D(LnOver)	-0.363476	0.312696	-1.162391	0.3291
FH	0.07108	0.005359	13.26331	0.0009
Cross-Section Short-Run - Qatar				
	Coefficient	t Statistics	St. D.	P-Value
COINTEQ01	-0.013396	0.002924	-4.580703	0.0195
D(LnOver)	-1.919044	1.652298	-1.161439	0.3295
FH	0.010682	0.012417	0.860271	0.4529
Cross-Section Short-Run - USA				
	Coefficient	t Statistics	St. D.	P-Value
COINTEQ01	0.002751	0.0000122	225.4813	0.0000
D(LnOver)	-0.095527	0.167317	-0.570933	0.6080
FH	0.002526	0.001568	1.611429	0.2055