The Impact of Oil Rent, Currency Overvaluation, and Institution Quality, on Economic Growth of Oil-Rich Countries: A Heterogeneous Panel Data Study

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Overview

Purpose:

- To examine economic growth and development challenges in oil rich countries facing rent seeking activities, currency overvaluation, and weak institutions

Analysis

- Currency overvaluation in specific countries identified by the model

Empirical model

- Identify overvalued currencies quality
- Setting institutional quality
- Assess the impact of oil rent and overvaluation on economic growth

Why Oil?

- Among minerals, petroleum creates the majority of problems for most countries, meaning the resource curse is mostly an oil curse. Ross (2012).
- Literature defines Oil-rich countries as countries with 10% and above oil exports to their GDP.
- Based on OPEC Database, there are about 28 countries in this category.
- According to data availability, 26 countries for the period of 1980 to 2017 considered for this study.

The World Crude Oil Exports (1000 b/d)

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

The Role of

Rent-Seeking

- Resource-rich countries are famous for rent-seeking activities because "far easier to get rich in these countries by gaining access to resources at favorable terms than by producing wealth." Stiglitz (2013)
- Todaro and Smith (2012) define rent-seeking as "efforts by individuals and businesses 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."

Institutions

- Institutions have more impact on income per capita than even geography or culture Acemoglu (2009)
- "Countries rich in natural resources constitute both growth losers and growth winners. We claim that the main reason for these diverging experiences is differences in the quality of institutions." (Mehlum et al. 2006)

Currency Overvaluation

- Several studies have provided empirical evidence that an overvaluation is associated with a negative impact on growth. (Dollar 1992; Razin and Collins 1999; Aguirre and Calderón 2005;Rodrik 2008; Elbadawi et al. 2012; Mbaye 2013)
- "Overvalued exchange rates are associated with shortages of foreign currency, rent-seeking and corruption, unsustainably large current account deficits, balance-of-payments crises, all of which are damaging to economic growth". (Rodrik 2008)

Contributions

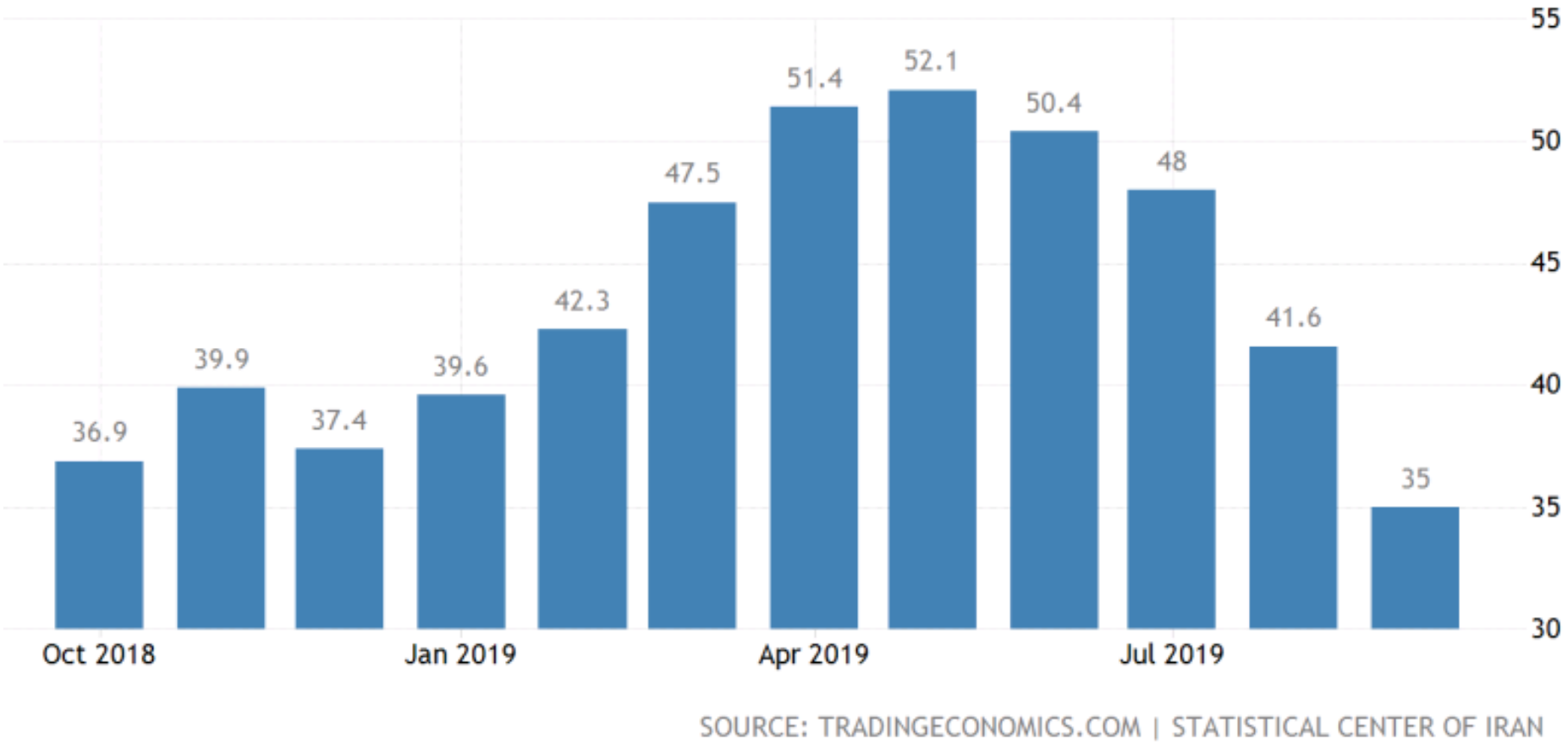
- Creates an interaction variable 'OilRent-Overvaluation' to study its impact on growth
  - Higher natural resource revenue is an open invitation to rent-seeking activities Arezki and Van der Ploeg (2007)

- Addresses endogeneity and heterogeneity problems focusing solely on crude oil dependency in Heterogeneous Panel Data Model
  - Cross-country heterogeneity produce biased and misleading results
  - Petroleum creates the majority of the issues (Ross 2012)
  - Differentiates between natural resource abundance (reserves) and dependency (exports) Brunnschweilera and Bulte (2008)

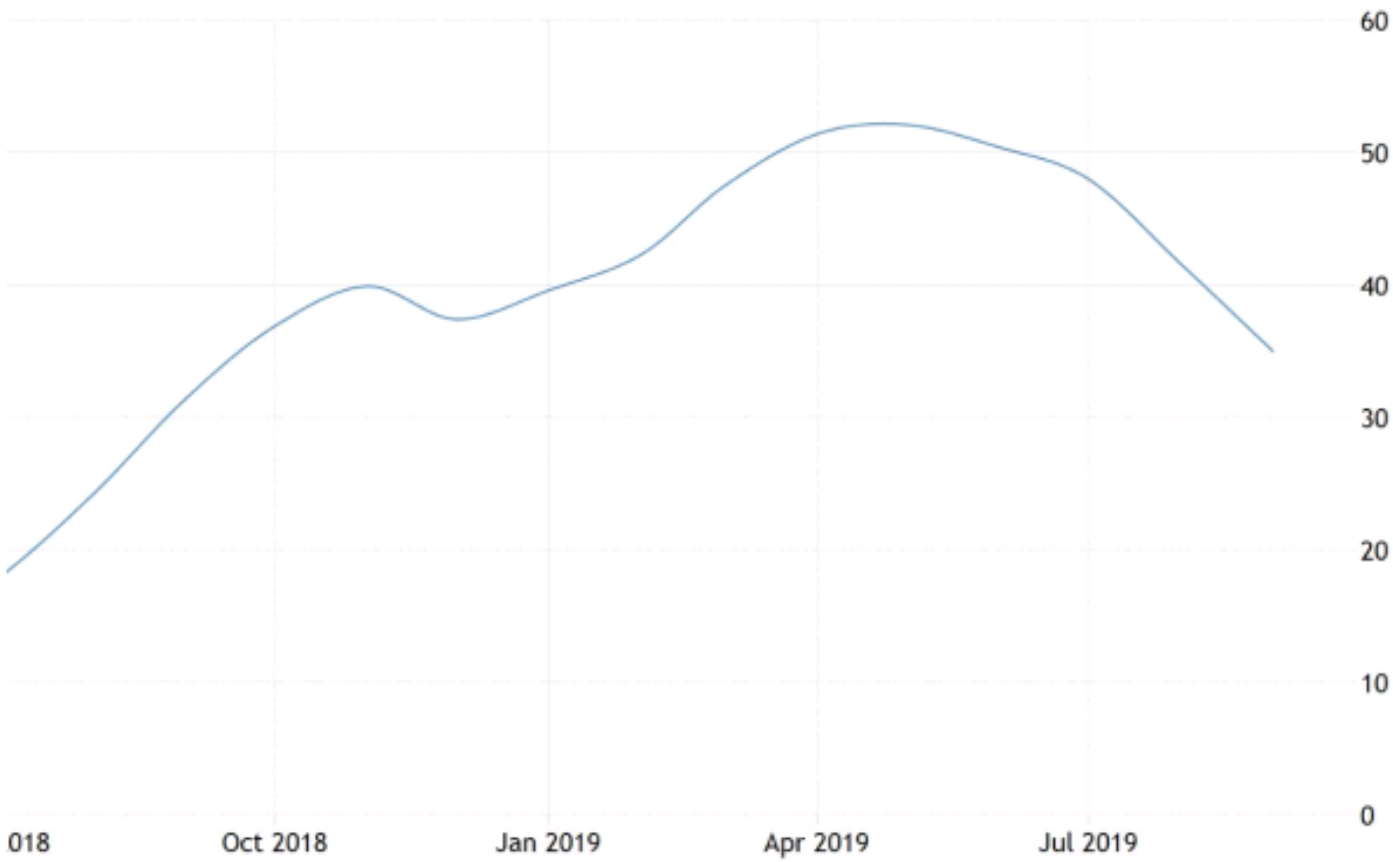
Findings

- Most oil-rich countries have overvalued currency
- Variables of oil rent and overvaluation have a significant adverse effect on economic growth in oil-rich countries with weak institutions.
- Countries with a better quality of institutions are more open to international trade
- Developing countries need structural change and implementing tailored economic development strategies.

The annual inflation rate in Iran



Iran Inflation Rate



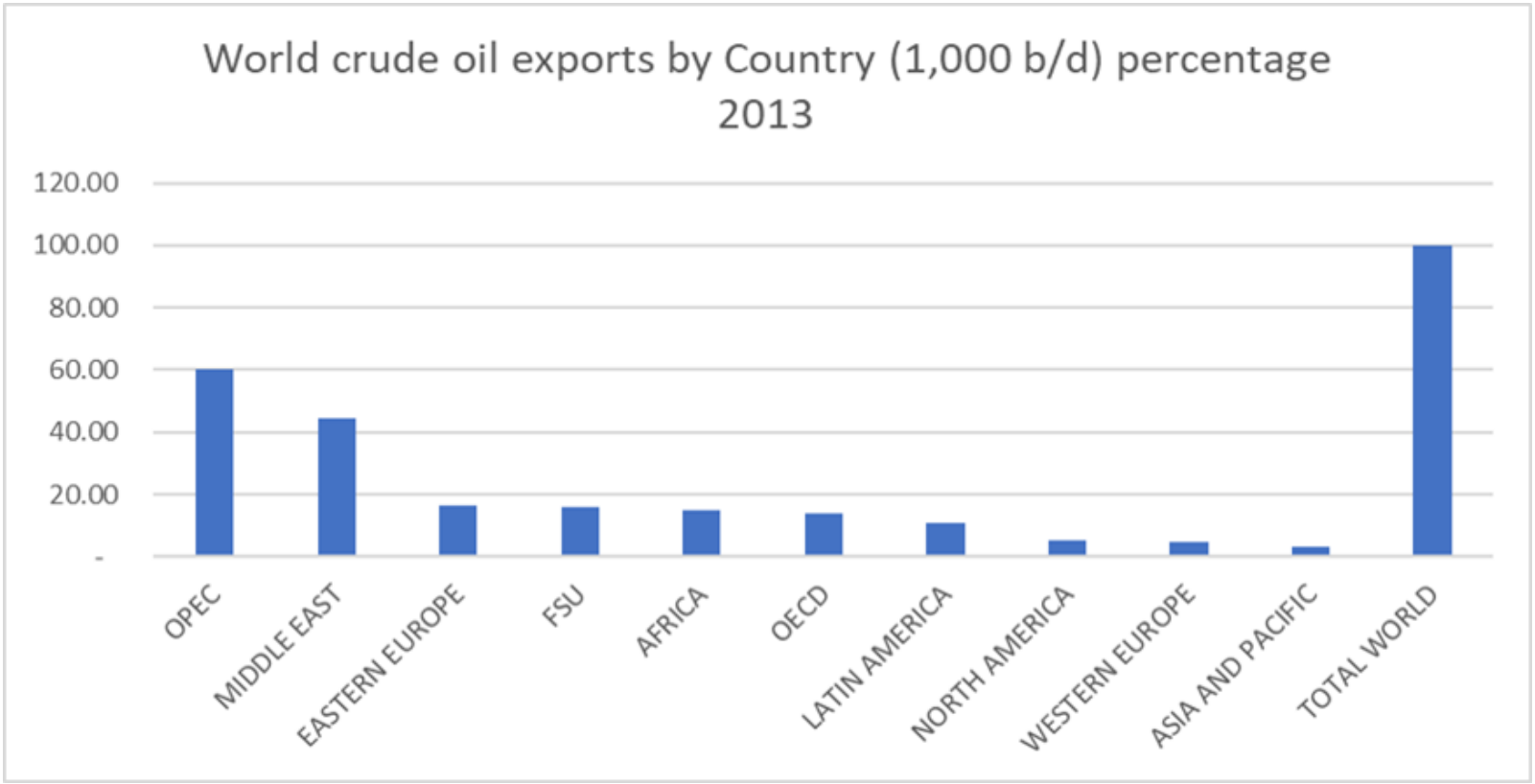
Iranian Rial

Iranian Rial

Real GDP Growth, 2018–24

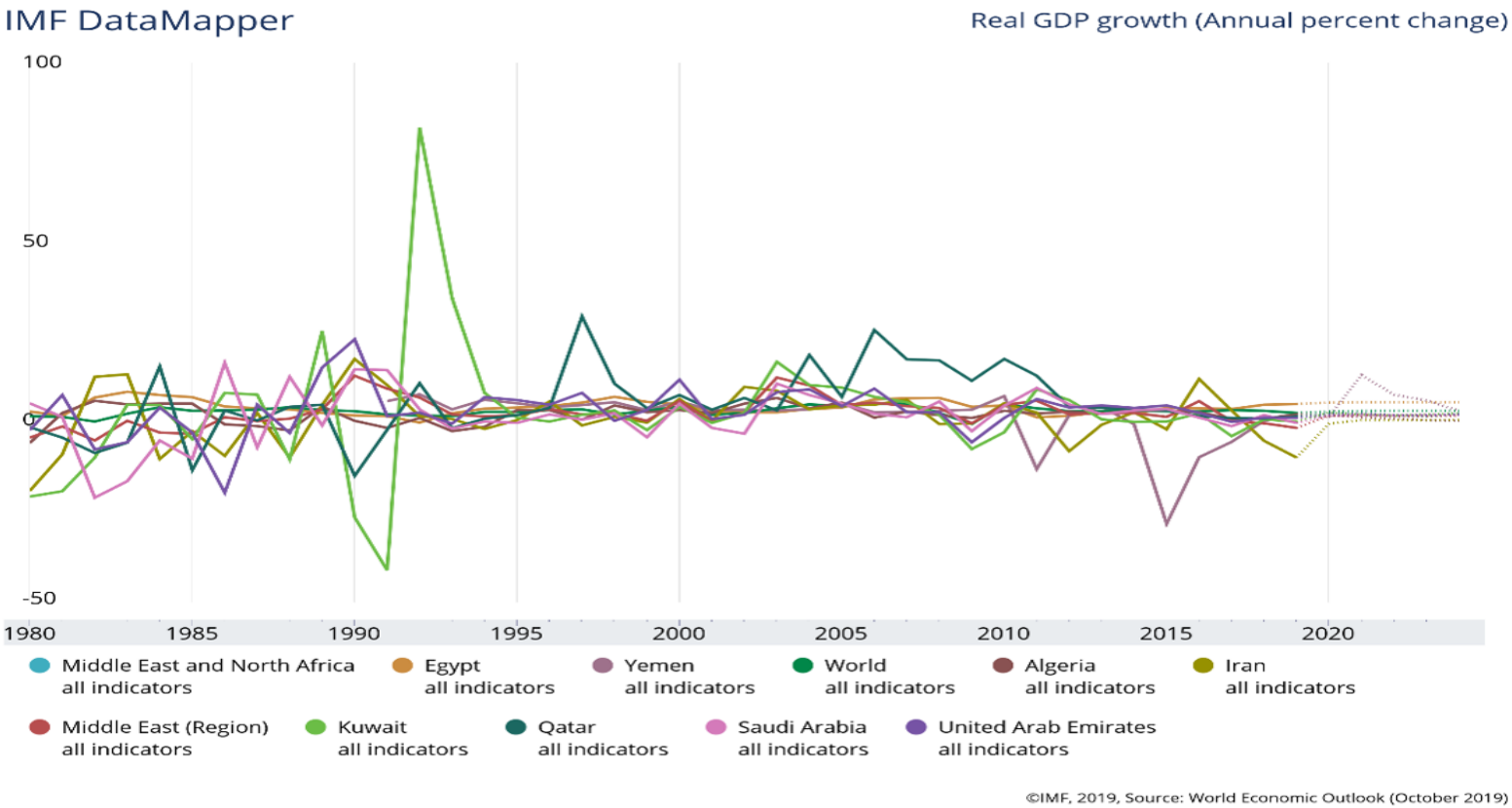
	2018	2019	2020	2021–24
World	3.6	3.0	3.4	3.6
Euro area	1.9	1.2	1.4	1.4
United States	2.9	2.4	2.1	1.6
China	6.6	6.1	5.8	5.7
Russia	2.3	1.1	1.9	2.0
MENAP	1.6	0.5	2.7	3.1
MENAP oil exporters	**0.2**	**–1.3**	**2.1**	**2.1**
of which: non-oil GDP growth	0.4	1.1	2.6	2.5
MENAP oil importers	4.3	3.6	3.7	4.8
CCA	4.2	4.4	4.4	4.5
CCA oil and gas exporters	4.1	4.3	4.4	4.5
of which: non-oil GDP growth	3.0	5.1	4.6	4.2
CCA oil and gas importers	5.2	4.9	4.5	4.5

World crude oil exports (%)



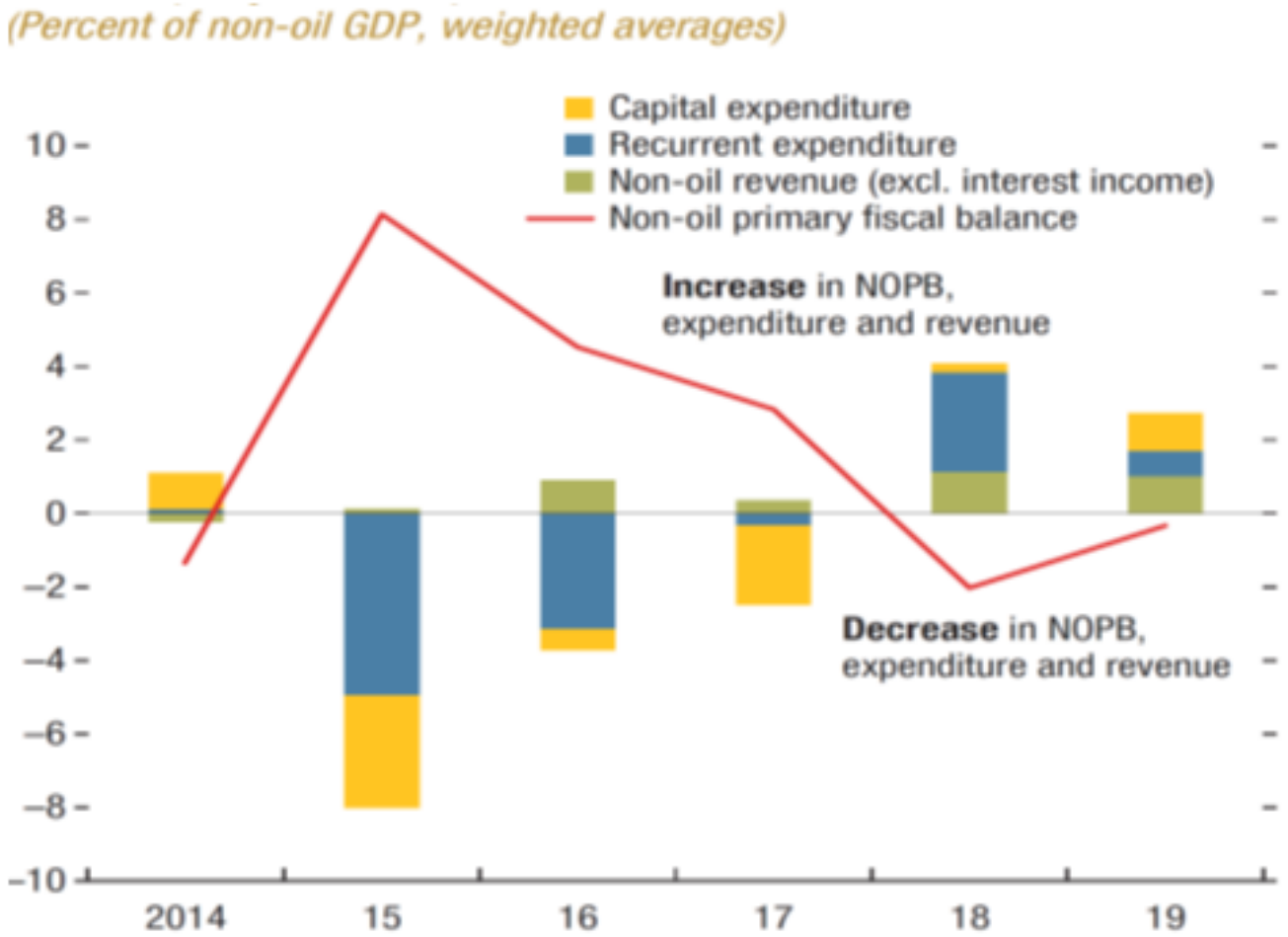
Source: OPEC

The Middle East economic growth rate



Source: IMF

MENA oil exporting countries: Changes in the non-oil primary balance, expenditure, and non-oil revenue



Source: IMF Outlook MENA Report October 2019
NOPB = non-oil primary fiscal balance

Conducting the Research

- **Two phases:**
  - Finding Currency Overvaluation
    - Determination of currency over or undervaluation in oil-rich countries
  - Finding Oil Rent-Overvaluation Impact on Growth
    - Data used to find a relationship between OilRent-Overvaluation and economic growth for oil-rich countries; considering the institutional quali

To determine currency overvaluation: two distinguished papers Dollar (1992) and Rodrik (2008)

Dollar

- Significant findings from Dollar (1992)
  - Calculates PPP distortion or so-called Balassa–Samuelson effect
  - Balassa–Samuelson effect
    - the 'law of one price' does not work on non-tradable goods
    - countries with higher incomes have more advanced technology more productive labor on tradable goods than low-income countries
    - different productivities lead to a deviation from PPP (Asea and Corden 1994)

Rodrik

- Rodrik (2008), every country's under/overvaluation for period of this study three steps
  - From PWT, divided the exchange rate (XR) by the PPP conversion rate to calculate the RER

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

where i is for countries and t is for time

Balassa-Samuelson Effect

- Non-tradable goods are cheaper in less developed countries
- RER adjusted for effect by regressing lnRER on GDP per capita, using rgdpo (real GDP at chained PPP)
- Then divided by population (pop), both obtained from the PWT

$$\ln RER_{it} = \alpha + \beta \ln (rgdpo/pop) + f_t + u_i$$

- 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
- The fitted value for each country and year, the Balassa–Samuelson adjusted rate was calculated.
- Over/Undervaluation calculated by subtracting RER from the above adjusted rate

$$\ln UNDERVAL_{it} = \ln RER_{it} - \ln RERfit_{it}$$

Overvaluation and Growth

- When UNDERVAL exceeds unity currency is undervalued (i.e., imports are expensive, but exports are relatively cheap).
- When below unity, the currency is overvalued (i.e., imports are cheap, and exports are relatively expensive).
- To see relationship between overvaluation and economic growth, Rodrik (2008) used

$$growth = \alpha + \beta \ln GDPpc_{i,t-1} + \delta \ln UNDERVAL_{it} + f_i + f_t + u_{it}$$

where GDP per capita annual growth is the dependent variable, f_i and f_t are the relative country and time fixed effect

Phase Two: OilRent-Overvaluation

- Institutions, customs, history, and stage of development may vary among countries and even may evolve over a long period
- The slope for each country, the coefficient β_i, may also differ over time
- To estimate non-stationary heterogeneous dynamic panels the mean group (MG) method
- MG is a general autoregressive distributed lag (ARDL) model that both intercepts and slopes can vary across cross-section units

ARDL Model

- A dynamic (ARDL) model with the assumption that all coefficients can vary across crosssectional units can be written as:

$$Y_{it} = a_i + \gamma_i Y_{t-1} + \beta_i X_{it} + \varepsilon_{it}$$

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:

$$\hat{\theta} = \frac{1}{N}\Sigma\vartheta_i \quad and \quad \hat{\alpha} = \frac{1}{N}\Sigma\ a_i$$

Cointegration

- Most macroeconomic variables are time depended or trended and non-stationary as their means are constantly increasing
- Problem with trended or non-stationary data is that the OLS estimator can be easily inconsistent and biased
- Cointegrated variables have both short- and long-run results while at the same time maintaining stationarity
- Models by combining two accumulated error terms, stochastic trends, that in a special case that their combination eliminating non-stationarity, the variables are cointegrated

Error Correction Model (ECM)

- The ECM can create a cointegrated stationarity in the form of:

$$\Delta Y_t = a_0 + b_1 \Delta X_t - \pi \hat{\mu}_{t-1} + \varepsilon_t$$

- 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 $\hat{\mu}_t \sim I(0)$
- 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:

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

- and π is the adjustment effect that shows how much disequilibrium has been corrected

Empirical Model

- A multivariable dynamic (ARDL) model with the assumption that all coefficients can vary across cross-sectional units

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

- 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.
- Model adapted based on based on Apergis and Payne (2014), Cavalcanti et al. (2011), and Mehlum et al. (2006)

Reparametrized to ECM

- The above ARDL model can be reparametrized as an Error Correction Model (ECM):

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

- where

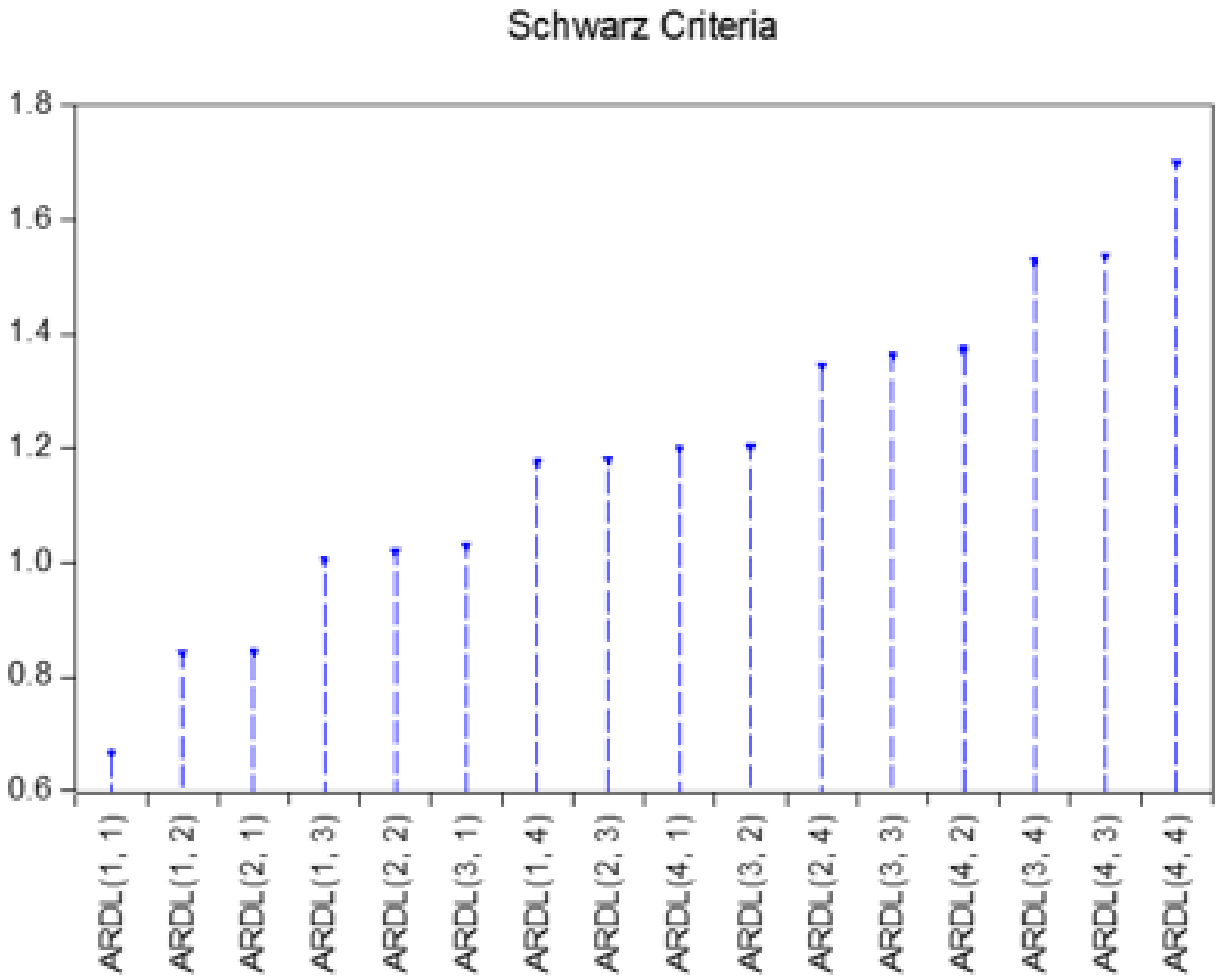
$$\omega_{j,t-1} = \ln y_{j,t-1} + \beta_{j1} \ln OR_{j,t} + \beta_{j2} \ln Ov_{j,t} + \beta_{j3} \ln IQ_{j,t}$$

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

Schwarz Criteria : ARDL (1, 1) The Best Choice



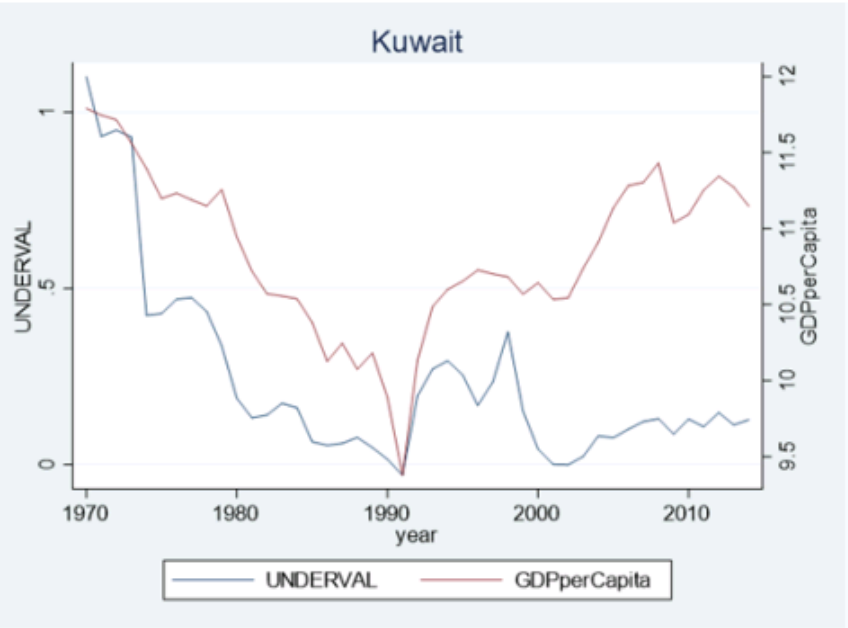
Time Series Regression of the Overvaluation in Selected Countries

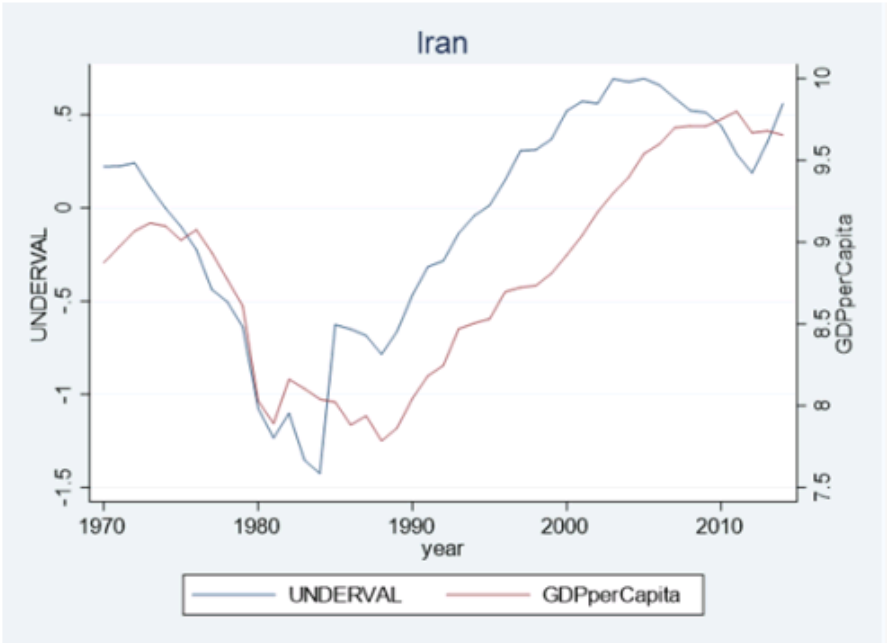
GDP per Capita	Iran	Indonesia	Kuwait	Saudi Arabia	Nigeria	Qatar
lnUNDERVAL	0.867***	1.355***	1.262***	0.623**	1.991***	2.273***
	(9.77)	(4.55)	(5.52)	(3.45)	(12.90)	(10.39)
_cons	8.876***	7.792***	10.54***	10.10***	8.731***	10.91***
	(84.42)	(84.42)	(128.86)	(151.93)	(88.86)	(209.15)
N	45	45	45	45	45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

t statistics in parentheses

* p<0.05, ** p<0.01, *** p<0.001

Overvaluation and Growth





MG Estimation for All Countries 1980-2017 LNOVER on LGDP

Coefficient		t Statistics	St. D.	P-Value
		Long-Run		
θ	-1.0019	0.1601	-62557	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

MG Estimation; GDP per capita and Interaction Variable 1980–2017

	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)

Further Step: Trade Openness

- Natural resource-rich countries have higher growth when open to International trade. Federal Reserve Bank of Dallas (2019)
- Due to high correlation between trade openness and institutional quality, if both present in the model, growth regressions of GDP per capita are uninformative. Dollar and Kraay (2003)

Analysis:

- The limited influence of trade liberalization on economic growth may relate to the weakness of institutions in developing countries. Baliamoune-Lutz and Ndikumana (2007)

Institutions and Overvaluation Effect on Trade Openness

- **Without enough confidence about enforcing contracts, even lowering trade barriers, firms will not engage in trade.** North and Weingast (2004)
- **An overvalued currency associated with loss of external competitiveness, squeeze on the tradable sector and increase the likelihood of balance of payments and currency crises.** Krugman (1979), Kaminsky and Reinhat (1999), Xiangming Li (2003), Chang, Kaltani, and Loayza (2009), Mbaye (2013), and Conrad and Jagessar (2018)
- **Overvaluation associated with foreign currency shortages, rent-seeking, and corruption,. . . all of which are damaging to economic growth.** Rodrik (2008)
- **Trade openness plays a key role in reallocating resources in the sectors where a country has a comparative advantage, which helps to reduce income inequality in resource-rich countries.** (*Vespignanietal*.2019)

Further Step: Trade Openness for Developing Countries 1980–2017

	1	2	3	4	5	6
	FE	FE	FE	FE	FE	MG
	Openness	LnOpen	LnOpen	LnOpen	LnOpen	LnOpen
LnOver		-0.315***		-0.264***	-0.262***	
		(-4.82)		(-4.00)	(-4.24)	
polity2	0.623**		0.0281***	0.0234***		
	(2.95)		(4.77)	(3.93)		
LnORFH					0.0481***	
					(9.57)	
LnOROver						-0.0138
						(-0.54)
__000007_t						0.00771**
						(2.95)
_cons	78.55***	4.023***	4.244***	4.096***	3.418***	*3.799***
	(94.61)	(101.79)	(183.19)	(94.42)	(46.54)	(20.80)
N	775	775	775	775	775	775

t statistics in parentheses

$*p < 0.05, **p < 0.01, ***p < 0.001$

FE Regressions; Trade Openness for Developing Countries 1980–2017

FE Estimation Models; Openness as Dependent Variable

	1	2	3	4	5	6	7
	LnOpen	LnOpen	LnOpen	LnOpen	LnOpen	LnOpen	LnOpen
LnOver	-0.0721*	-0.0973**		-0.264***	-0.262***		-0.219**
	(-2.41)	(-3.25)		(-4.00)	(-4.24)		(-2.87)
polity2	0.0130***		0.0281***	0.0234***			
	(4.93)		(4.77)	(3.93)			
FDI	0.0157***	0.0165***	0.0152***				
	(6.29)	(6.50)	(6.11)				
LnORFH					0.0481***		
					(9.57)		
OilPrice						0.00201***	-0.0138
						(6.69)	(-0.54)
_cons	4.142***	4.097***	4.244***	4.096***	3.418***	4.100***	3.996***
	(145.31)	(149.31)	(183.19)	(94.42)	(46.54)	(261.48)	(97.54)
N	735	735	775	775	775	735	775

t statistics in parentheses

$*p < 0.05, **p < 0.01, ***p < 0.001$

Conclusions

- Essential to consider sustainable growth in developing countries beyond standard growth components
- Economic development is more than improvements in incomes and output and typically involves radical changes on institutions and social structures as well as customs and beliefs (Todaro and Smith 2012)
- Any scrutiny of economic growth in developing countries must consider the stage of economic development in those countries (Acemoglu 2009)