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ARAŞTIRMA MAKALESİ / RESEARCH ARTICLE

EXPORT SOPHISTICATION AND ITS IMPACT ON GROWTH: CASE STUDY FOR MENA COUNTRIES

İHRACAT GELİŞMİŞLİĞİ VE BÜYÜMEYE ETKİSİ: MENA ÜLKELERİ ÜZERİNE BİR ÇALIŞMA

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Abstract

This study initially calculates export sophistication of Middle East and North Africa (MENA) countries to make a comparison in the region and in between OPEC and non-OPEC countries for 2004-2016 period. Secondly, short and long run empirical analysis are applied to examine the effect of export sophistication on GDP per capita growth controlling for several macroeconomic variables. Lastly, panel VAR is utilized to decompose the variation in growth rate. Empirical findings suggest positive effect of sophistication on growth rate controlling for oil prices and OPEC membership and export sophistication is observed to be the key variable to explain the variation in growth rate out of several candidate variables.
Keywords: Export sophistication, Economic growth, MENA countries
JEL Classification: F14, F43, O47

Öz

Bu çalışma, öncelikle 2004-2016 dönemi için, OPEC üyesi olan ve olmayan ülkeler arasında bir karşılaştırma yapmak için Orta Doğu ve Kuzey Afrika (MENA) ülkelerinin ihracat gelişmişliğini hesaplamaktadır. İkinci olarak, ihracat karmaşıklığının kişi başı GSYİH'daki büyüme oranları üzerindeki etkisini incelemek için çok sayıda makroekonomik değişken kontrolü altında, kısa ve uzun vadeli ampirik analizler uygulanmaktadır. Son olarak, büyümede oranlarındaki varyansın ayrıştırılması için Panel VAR analizi yöntem olarak kullanılmaktadır. Ampirik bulgular, petrol fiyatları ve OPEC üyeliği gösteren değişkenlerin kontrolü altında, ihracat gelişmişliğinin büyüme oranları üzerindeki olumlu etkisini göstermektedir ve ihracat

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gelişmişliğinin çok sayıdaki aday değişken arasından büyüme oranlarını açıklamada anahtar değişken olduğu görülmektedir.
Anahtar Kelimeler: İhracat gelişmişliği, Ekonomik büyüme, MENA ülkeleri
JEL Sınıflandırması: F14, F43, O47

1. Introduction

Economic development is the process of structural transformation as countries' economic structure diversify from agriculture and manufacturing to service sector. In order to ensure this transformation, and hence, stable growth, economies should upgrade their productive structure, moving from lower to higher value-added products. A prominent study to scrutinize the impact of export sophistication on economic growth proposed by Hausmann et al. (2007) argues that countries exporting goods associated with higher productivity grow more.

Middle East and North African (MENA) region is a special region with resource-rich countries (natural and/or labor). Reserves of high natural resources is argued to be a resource curse due to the high dependence in energy prices as for economic policies. On the other hand, many region countries are discussing policies to lower the dependence to reach sustainable growth. Under the idiosyncratic structure of MENA countries, this study measures the level of export sophistication and examines how it affects economic growth under the short run and long run inspection for the period of 2004-2016. Graphical inspection reflects a lower export sophistication for OPEC members compared to other countries in the region. Empirical findings are highlighting the importance of export sophistication for the region in both short run and long run. Moreover, out of several determinants, export sophistication turns out to be the highest determinant of economic growth. To our knowledge, this is the first study to examine the export sophistication for Middle East and North African countries (MENA) and examining its impact on growth.

Developing countries including MENA may use the advantage of being the follower, i.e., learning know-how and the spillover effects to transform the production facility to higher sophistication levels. Open economic structure further increases diffusion of technology from the developed world. However, exporting more sophisticated products is another level together with the competition in the global markets. Specialization on some specific products may provide productivity whereas some may not which highlights the importance of good governance by choosing optimal policies. An index for the product complexity (PCI) is designed by Hausmann et al. (2011) that calculates the knowledge intensity of a product by considering the knowledge intensity of its exporters. In the same manner, economic complexity index (ECI) measures the knowledge intensity of an economy by considering the knowledge intensity of the products it exports. These annual indices enable country and product comparisons in terms of complexity and hence provides information for the policy-makers.

There is a vast literature regarding the importance of product diversification in exports, especially for developing country groups in reducing export fragilities and contributing to economic growth. However, it is becoming more dominant in the relevant literature that the technological density of

the export basket, rather than product variety, affects economic growth. One of the main results of these studies is that the effect of export product diversification on economic growth depends to a large extent on how production concentrates on sophisticated products (Rodrik, 2006; Hausmann et al., 2007; Di Maio and Tamagni, 2008; McMillan and Rodrik, 2011). Another relevant result is that countries are more indispensable and powerful in international production / trade relations together with the production of more sophisticated products rather than homogeneous products (Besedes and Prusa, 2006; Brenton et al., 2010; Corcoles et al., 2014). There are several studies that agree on the effect of sophistication on growth (Hidalgo and Hausmann, 2009; Hausmann and Hidalgo, 2011) whereas the initial paper to measure export sophistication do not observe strong relationship using a similar measurement (Lall et al., 2005). Jarreau and Poncet (2012), investigating the link for Chinese provinces, find positive impact of export sophistication on growth. Grancay et al. (2015) examine the validity of the link during economic crisis and inflation and confirm the link for 206 countries in the period 2004-2013. Lederman and Maloney (2012) also confirm that "what you export matters". Fortunato and Razo (2014) using 158 countries during the period 1996-2008 confirm the effect. Lin et al. (2017) concentrates on Sub-Saharan African countries for short and long run and find positive impact of export sophistication on GDP per capita.

The rest of the paper is organized as follows. Next section explains export structure of MENA countries. Section 3 presents the data and methodology. Section 4 discusses empirical findings. Last section concludes the paper.

2. Export Structure of MENA countries

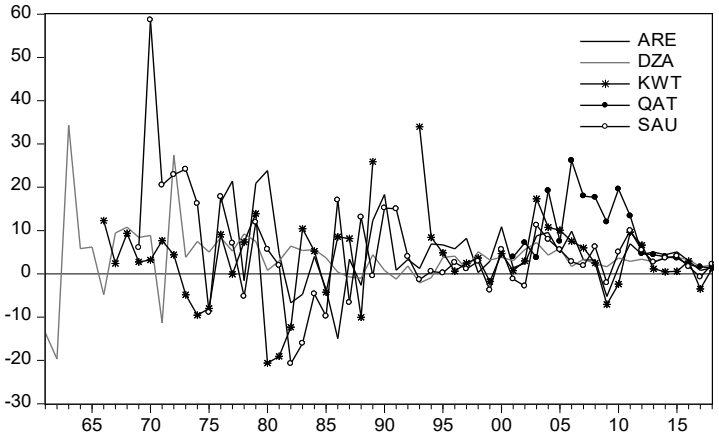
MENA countries are composed of developing countries according to United Nations classifications[1]. Out of MENA region, Israel comes up as the first according to human development, ranking 22nd in the world (UN Human Development Index[2], 2019); Qatar comes up first according to per capita income (2016 GDP per capita, constant US dollars, 2010 base year) with 64.3 thousand US dollars, and is followed by United Arab Emirates, Kuwait and Israel, successively; United Arab Emirates, Saudi Arabia and Turkey come up as the first three according to total exports (2016, exports of goods and services, constant US dollars, 2010 base year), where the first and the second are the oil exporters. MENA region includes natural resource-rich countries which provides some advantages and disadvantages in the international arena. Natural resource-abundance has its direct advantages on indicators such as export, fiscal revenue, foreign exchange; and may have indirect contributions on alternative sectors conditional on the fact that the funds are transferred to these sectors. Fasano and Iqbal (2003) discusses the unprecedented economic social transformation of GCC (Cooperation Council of Arab States of the Gulf) countries together with the open economy system. Oil export is the key to economic growth of these countries and that contributed to regional economic growth (Fasano and Iqbal, 2003). However, graphical inspection of OPEC countries up to recent data reflects

1 https://www.un.org/en/development/desa/policy/wesp/wesp_current/2014wesp_country_classification.pdf, Accessed by November 17, 2019.

2 http://hdr.undp.org/en/data, Accessed by November 17, 2019.

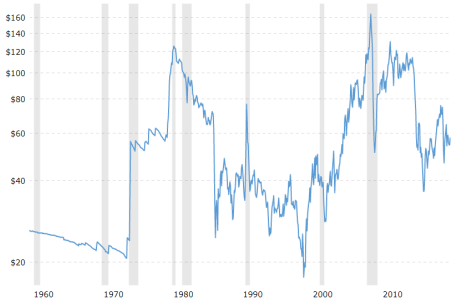
that growth rates are high but volatile in the earlier periods but lower and stable in the recent periods, given Figure 1. High volatility is attributed to volatile structure of oil prices (Figure 2) and relatively more oil-dependent economic structure, i.e., less diversified economy of the oil-exporters.

Figure 1: GDP growth rates (%) of OPEC MENA countries (1961-2018)



Source: World Bank, 2019.

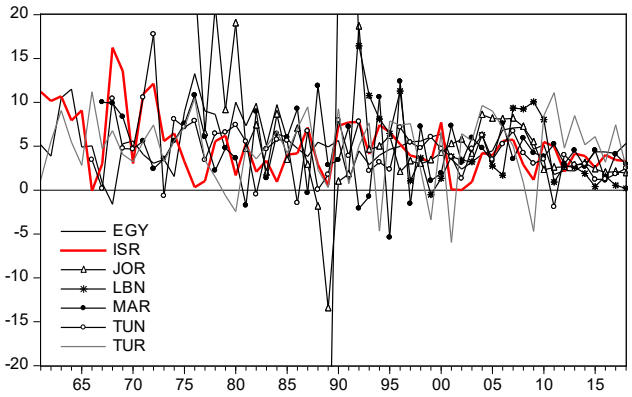
Figure 2: Annual West Texas Intermediate Crude Oil Prices



Source: Macrotrends, 2019. Accessed from: https://www.macrotrends.net/1369/crude-oil-price-history-chart

On the other hand, Figure 3 of non-OPEC countries in the same region, i.e., MENA region, are reflecting relatively lower but less volatile growth rates. Absence or scarcity of natural resources sounds less advantages and more challenging in creating funds, however forces economies to find their comparative advantages and hence creates economic diversification that reduces volatilities while increasing stability.

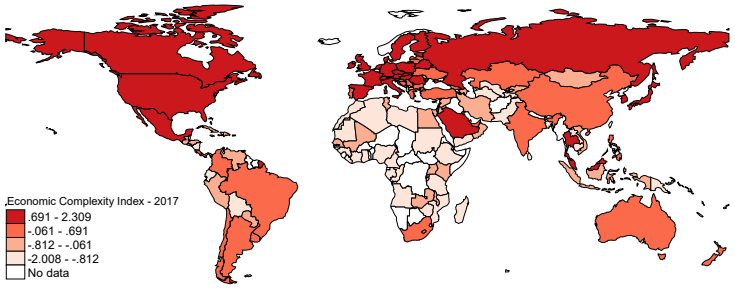
Figure 3: GDP growth rates (%) of Non-OPEC MENA countries (1961-2018)



Source: World Bank, 2019.

None of the countries are doomed to resource curse, defining a trap that countries with natural resources abundance tend to have less economic growth and suffer from poor development indicators. In fact, there is a prolonged discussion on economic diversification of oil-dependent countries. An early study of Fasano-Filho and Iqbal (2003) highlights unsatisfactory results from diversification as non-oil sector growth rates are poor compared to oil-sector. A recent study of Movchan et al. (2017) discusses the difficulty of diversification such that there is no example that is successful in completely diversifying from oil. IMF Bahrain staff paper (2016) reflects that by 2014, oil composes 63% of GDP in Kuwait; 51% of Qatar, 43% of Saudi Arabia, 34% of United Arab Emirates and 27% of Algeria. The ongoing dependence on oil and the low sophistication level of crude petroleum and its derivatives signify the undesirable outcome of lower export values and lower growth rates. Figure 4 reflects economic complexity index (ECI) in global-wise which is a measurement for the knowledge intensity of an economy by considering the knowledge intensity of the products it exports. MENA region overall has a lower complexity except for Israel[3], which is in the top 20 in terms of ECI.

Figure 4: Global Economic Complexity Index – 2017

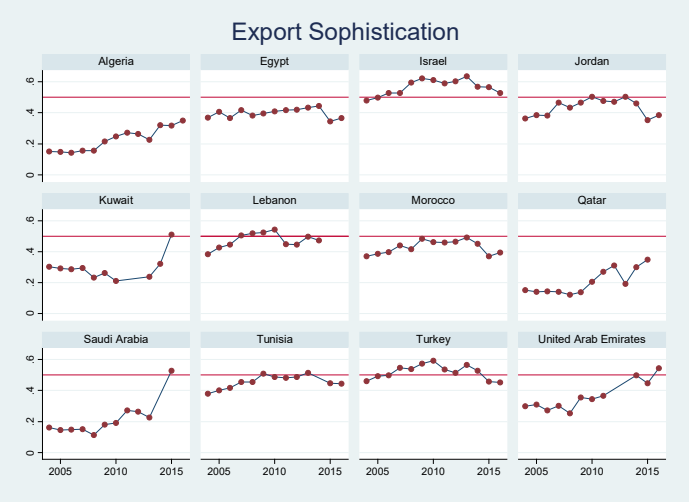


Note: spmap module in STATA is used for mapping.
Source: Author's own calculation.

3 Israel ranks 17th in ECI by 2017. https://oec.world/en/rankings/country/neci/, Accessed by November 17, 2019.

Figure 5 reflects export sophistication level of each MENA country for the period of 2004-2016. The calculation method of this metric is explained in Section 3. Drawing horizontal line for a hypothetical level of 0.5, Israel is again observed to stand out within the time horizon. Turkey is following Israel with a declining pattern recently. Surprisingly, all five OPEC countries in our dataset, namely as, Algeria, Kuwait, Qatar, Saudi Arabia and United Arab Emirates, do have a rising trend in export sophistication, whereas none of the rest of the countries in our dataset, i.e., that are not OPEC member, reflect such a pattern.

Figure 5: Export Sophistication Levels of MENA countries



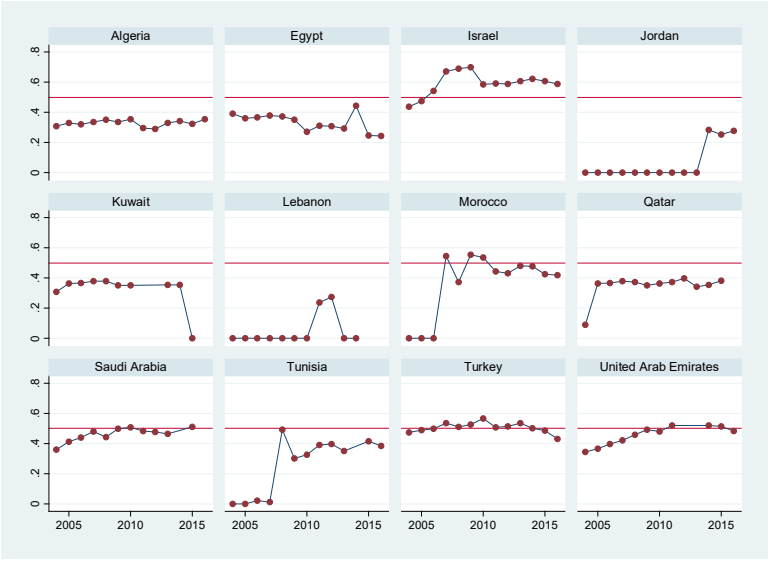
Note: Red line depicts a hypothetical threshold of 0.5.
Source: Author's own calculation.

Figure 6 concentrates on the export products that are above 1 Billion US dollars value of MENA countries to filter the products for an examination of the domination position in the world market. Using a hypothetical level of 0.5, a similar structure to export sophistication is observed, such that Israel ranks first in the overall time horizon; Turkey comes up as second however the pattern is downward recently. Saudi Arabia and United Arab Emirates are close rivals.

The filtered export products using 1 billion US dollars threshold are provided in the Appendix for the recent year available using SITC4 (rev.2) classification, i.e., 4-digit product classification. United Arab Emirates (ARE) has 13 4-digit products and it is dominating world market for Internal Combustion Engines for Aircraft with the world export share of 42.9%. Algeria (DZA) has 3 4-digit products, all of which are petroleum and its derivative. Besides, there is no domination in the world markets for any of these products. Egypt (EGY) has 2 4-digit products, all of which are natural resources and has no domination. Israel (ISR) has 6 4-digit products. For 2 of them, namely as Electronic Microcircuits; and Miscellaneous Electrical Machinery, there is no domination in world market, but these two products are the most sophisticated export products within the region. Jordan (JOR) has only 1

product above the threshold. Morocco (MAR) has 4 products but holds no dominance in any of these products. Qatar (QAT) has 3 products and is holding world dominance in the market for Liquified Petroleum Gases with the world export share of 48%. Saudi Arabia (SAU) has 9 products, 3 of which are dominating world markets, namely as Polyethylene; Polypropylene; Ethers and Acetals. Tunisia (TUN) has 1 product and has no dominance. Turkey (TUR) has 28 4-digit products that are above the threshold of 1 billion US dollar export value. For 2 of them, namely as Miscellaneous Man Made Carpets; and Wheat Flour, Turkey is holding world dominance with the world export shares of 23.9% and 23.7%, respectively. Besides, Turkey ranks second in the product of 2 products, namely as, Iron Bars and Rods; Synthetic Knitted Undergarments; and Nuts, with the world export shares of 8.8%, 7% and 7.1%, respectively. Kuwait (KWT) and Lebanon (LBN) has no products above the threshold.

Figure 6: Average PCI of the Products with Export Value above 1 Billion US dollars



Note: Red line depicts a hypothetical threshold of 0.5.

Source: Author's own calculation.

3. Methodology

3.1. Empirical Model and Dataset

Besides the descriptive analysis of export sophistication of MENA countries and country comparison within the region, we empirically investigate the effect of export sophistication (ES) on GDP per capita growth (GR) using several control variables (*Y*). The control variable selection takes the relevant literature (human capital, investment and institutional variable, crisis dummy) and the specification of the country group into account (oil price, OPEC dummy).

$$GR_{it} = f(ES_{it}, Y_{it})$$

where $i = 1, \ldots N, t = 1, \ldots T$. Time component and cross section unit are represented with *T* and *N*, successively. Export sophistication is calculated using PCI following the methodology of Lectard and Rougier (2018), instead of Prody Index designed by Hausmann et al. (2007). Lectard and Rougier (2018) suggest that this specification bypasses the circularity problem that rich tend to export rich-country products. Sophistication is simply the weighted average of PCI, where weights are the value shares of the products (*k*) in the country's (*i*) total exports for the year (*t*):

$$ES_{it} = \sum_{k} \frac{x_{ikt}}{X_{it}} PCI_{kt}$$

Hausmann et al. (2014) explains that PCI ranks the degree of capabilities required by a product that is measured by its diversity and ubiquity. Diversity is defined as the amount of embedded knowledge that a country has and ubiquity is defined as the number of countries that make a product, such that, the lower the ubiquity, the more complex the product is. As PCI is an index including negative numbers, following Lectard and Rougier (2018), we rescale[4] the index to obtain a positive scale. SITC4 (Rev.2) classification is used for PCI. PCI and the export values for 773 products for the period 2004-2016 are employed from MIT's Observatory of Economic Complexity[5].

Oil prices are OPEC basket price[6]. The rest of the data is obtained from World Bank. As for institutional variable, regulatory quality (RQ) of Worldwide Governance Indicators (WGI) is used which reflects perceptions of the regulatory success of the government. GDP per capita growth (GR) is calculated as the logarithmic difference of GDP per capita of constant US dollar with 2010 base year. Gross secondary school enrollment rate is employed as a proxy for human capital. Gross fixed capital formation as a ratio of GDP is used to measure investment.

Table 1 presents the descriptive statistics of the panel dataset. 14 MENA countries for 2004-2016 annual frequency dataset are employed in our empirical model, namely as, United Arab Emirates (ARE), Algeria (DZA), Egypt (EGY), Iran (IRN), Iraq (IRQ), Israel (ISR), Jordan (JOR), Kuwait (KWT), Lebanon (LBN), Morocco (MAR), Qatar (QAT), Saudi Arabia (SAU), Tunisia (TUN), Turkey (TUR). 5 countries are OPEC members, namely as, United Arab Emirates, Algeria, Kuwait, Qatar, Saudi Arabia. In both models, we control for OPEC membership using OPEC dummy. Global financial crisis is identified with a crisis dummy for 2009 year only.

4 PCI is rescaled as follows: $\frac{PCI_k - \min(PCI_k)}{\max(PCI_k) - \min(PCI_k)}$

5 PCI data are obtained from https://oec.world/en, export values data are obtained from https://oec.world/en/resources/data, Accessed by November 15, 2019.

6 https://www.opec.org/opec_web/en/data_graphs/40.htm, Accessed by November 14, 2019.

Table 1: Descriptive Statistics

	GR	ES	RQ	Oil Price	Investment	Human Capital
Mean	1.24	0.39	0.10	73.78	23.90	88.63
Maximum	9.42	0.64	1.32	109.45	43.05	117.84
Minimum	-15.15	0.11	-1.28	36.01	12.45	48.55
Std. Dev.	4.08	0.13	0.56	25.45	5.63	14.59
Observations	156	145	156	156	136	95

Note: Panel data is not balanced as the number of observations varies in each variable.

3.2. Methodology

The empirical model is investigated using both static and dynamic methodologies under panel data framework. Pooled OLS, fixed effect models[7] are employed for static analysis, which provides long run information on the model. For short run information, dynamic panel model is employed using the lagged variables. In dynamic panels with fixed effects, OLS estimation ends up with endogeneity problem when the lagged dependent variable is used as a regressor. As a remedy, methodologies employing instrumental variable are used. Accordingly, we utilize generalized method of moments (GMM), proposed by Arellano and Bond (1991), which allows for unobserved panel-level effects to be correlated with the lags of the dependent variable. Besides its conformity in dealing with endogeneity problem, GMM methodology is also preferred in the small T and large N cases.

Furthermore, we employ panel VAR methodology to obtain variance decompositions of the regressors. Panel VAR is first proposed by Holtz-Eakin et al. (1988). A homogenous panel VAR of order *p* with panel-specific fixed effects is modeled as follows:

$$Y_{it} = \sum_{j=1}^{p} A_j Y_{it-j} + X_{it} B + u_i + e_{it}$$

where Y_{it} is a vector of endogenous variables, X_{it} vector of exogenous variables, and u_i and e_{it} are vectors of panel fixed effects and idiosyncratic errors, successively. Using lagged dependent variable on the right-hand-side will lead to biasedness even with large number of cross-sectional units. Generalized method of moments (GMM) technique will help obtain consistent estimates with small time period in dynamic panel analysis. In order to control for cross sectional heterogeneity, forward orthogonal deviation (Helmert transformation) is used which is suggested by Arellano and Bover (1995). In this study, we employ STATA routine of variance decomposition of panel VAR of Abrigo and Love (2016) to decompose the variation of growth using all right-hand-side variables.

7 In order to choose between random or fixed effect, we follow Hausman test which results in the rejection of the null hypothesis that the preferred model for individual-level effects is random-effects.

4. Empirical Findings

Table 2 presents static analysis for the model using pooled OLS and fixed effect[8]. Static analysis theoretically provides information about the long run relationship. For all models, sophistication (ES) has positive and significant effect on growth. This finding confirms Hausmann et al. (2007). The rest of the model is also consistent with the literature such that institutional quality (RQ) contributes to growth whereas oil price has negative impact on growth. Last but not least, the dummy variables are significant. Global crisis did not miss MENA countries, lowering economics growth around 4%. Finally, an interaction term for oil price and OPEC dummy is included to control for OPEC membership. The findings reflect that even though the rise in oil prices affects growth negatively, it is inverse for OPEC members. In other words, higher oil prices contribute to the economic growth of OPEC members in the MENA region in the long run.

Table 2: Static Analysis

	(1)	(2)	(3)	(4)	(5)	(6)
	FE	**FE**	**FE**	**FE**	**FE**	**Pooled**
ES	19.300***	23.100***	13.600***	12.300***	14.939**	6.87**
	(5.450)	(5.450)	(5.070)	(4.710)	(5.736)	(3.35)
RQ	5.220***	6.170***	6.630***	6.280***	6.904***	-0.0799
	(1.720)	(1.700)	(1.780)	(1.660)	(1.747)	(0.822)
Oil Price			-0.046***	-0.032**	-0.036**	-0.0430***
			(0.018)	(0.013)	(0.014)	(0.0150)
Human Capital						-3.96e-03
						(0.0268)
Investment					0.091	0.178***
					(0.104)	(0.0608)
Oil Price*OPEC Dummy		0.078***	0.068**			
		(0.027)	(0.029)			
Crisis Dummy				-4.390***	-4.870***	
				(1.050)	(1.078)	
Constant	-13.500***	-20.200***	-15.600***	-10.500***	-4.346	-0.0134
	(2.420)	(3.320)	(3.150)	(2.340)	(2.764)	(0.0356)
Observations	133	133	133	133	118	75
Number of pid	12	12	12	12	10	-
Effect	country/time	country/time	country	country	country	-
R-sq	0.49	0.52	0.36	0.44	0.47	0.36
Hausman test	0.0014	0.0011	0.0002	0.0119	0.0007	-

Note: *, **,*** denote significance at 10%, 5% and 1%, successively.

Table 3 provides dynamic analysis using GMM methodology. Since we expect some persistence for the dynamic specification of GDP growth, inclusion of the first lag of the dependent variable as a

8 Since time period is short in the empirical model, unit root test is redundant.

regressor is highly informative. However, due to the endogeneity problem, we employ GMM with lagged values of several variables as instruments. GMM setup includes lagged levels and differences as instruments (see details in the note of Table 3). Diagnostics for GMM models are reflecting that the empirical models are passing over-identification and serial correlation tests as we are failing to reject the null hypothesis that the instruments are valid; the subset of the applied instruments are exogeneous (difference-in-Hansen); and there is no serial correlation.

GMM models reflect that the persistence parameter (autoregressive coefficient) is positive and significant which reflects that economic growth is highly affected from previous year's growth rate. Export sophistication is found to have significant and positive effect on growth in the short run as well. Similar to the long run analysis, oil price reflects negative effect, however RQ seems to be no longer significant in the short run. Put it differently, it is found that institutional development contributes to economic growth in the long run however, it is not effective in the short run. Crisis dummy also reflects its existence in the short run. Finally, controlling for the OPEC membership, the interaction term for the oil price and OPEC membership is found to be positive and significant. Hence, being a member lowers the negative effect of the rise in oil prices in the short run.

Table 3: Dynamic Analysis – GMM

Variables	(1)	(2)	(3)	(4)	(5)	(6)
GR(-1)	0.502***	0.484***	0.391**	0.528***	0.413**	0.443**
	(0.146)	(0.150)	(0.158)	(0.125)	(0.162)	(0.174)
ES	9.256*	8.219*	17.59***	12.65**	14.83***	20.02**
	(5.002)	(4.592)	(5.914)	(6.238)	(5.543)	(8.196)
RQ		1.495	1.135	0.298	1.412	0.776
		(1.049)	(1.585)	(1.154)	(1.637)	(1.808)
Oil Price(-1)			-0.0383***	-0.0295**	-0.0285**	-0.0454***
			(0.0132)	(0.0130)	(0.0143)	(0.0166)
Investment				0.0662		
				(0.0851)		
Crisis Dummy					-2.753**	
					(1.286)	
Oil Price*OPEC Dummy						0.0411*
						(0.0247)
Constant	-3.369*	-3.079	-3.666*	-4.251**	-3.137*	-5.340*
	(2.001)	(1.959)	(2.012)	(2.157)	(1.870)	(3.169)
Observations	133	133	133	118	133	133
Number of pid	12	12	12	11	12	12
p-values for post estimation						
AR(2)	0.404	0.470	0.330	0.564	0.755	0.434
Hansen test exc.group	0.630	0.566	0.815	0.914	0.841	0.751
Difference in Hansen	0.955	0.935	0.534	0.942	0.784	0.673

Note: All equations include period dummies. System-GMM estimator is used with the first two lags of oil price, RQ, ESI and the second and the third lag of gdppcgr as instruments. All standard errors are robust.

Finally, we employ Panel VAR methodology to investigate variance decomposition for economic growth. This technique also has short run specifications. Variance decomposition reflects how the variation of the dependent variable is decomposed to each of the explanatory variables as a ratio. The findings suggest that out of 5 explanatory variables that are most used in the literature to determine GDP growth, export sophistication has the highest level of explanation of more than 10%. In short run analysis, it is expected that the highest ratio belongs to the past variation of the variable itself as the dynamic analysis takes the time horizon into account. The ratio that is left from the sum of 5 explanatory variables (which is around 65% for horizon 3) belongs to the past variations of GDP growth itself.

Variance decomposition from panel VAR reflects that the fluctuation in the economic growth is mostly explained by export sophistication that highlights the importance of products complexity for the MENA countries. MENA countries are mainly developing and rich-in-resource (natural resources and labor resource) countries. However, dependence on the resources is not providing a sustainable growth model over the time horizon. Hence, the literature discusses the adaption of policies to circumvent the dependence problem for oil producer MENA countries (Bhattacharyya and Blake, 2010; Belaid et al., 2021; Matallah, 2020). At this point, producing and exporting relatively more sophisticated products stand out as a remedy for sustainable growth.

Table 4: Panel VAR Decomposition of GDPPC growth

Horizon	Sophistication	RQ	Oil Price	Human Capital	Investment
1	0.115	0.000	0.000	0.000	0.000
2	0.100	0.003	0.006	0.055	0.060
3	0.187	0.008	0.011	0.080	0.073
4	0.185	0.017	0.018	0.077	0.070
5	0.176	0.025	0.023	0.075	0.075
6	0.173	0.031	0.025	0.078	0.076
7	0.171	0.034	0.027	0.081	0.075
8	0.170	0.037	0.029	0.083	0.076
9	0.168	0.039	0.030	0.086	0.077
10	0.167	0.040	0.031	0.089	0.077

Note: STATA command PVAR of Abrigo and Love (2015) is used.

5. Conclusion

This study investigates the export sophistication of MENA countries for the period 2004-2016. The figures reflect a positive trend in the export sophistication of oil-exporters in the region. Israel and Turkey are observed to be the countries with the highest export sophistication. Regarding the effect of sophistication on growth, static and dynamic models are utilized. Empirical findings are consistent with Hausmann et al. (2007) such that sophisticated production is associated with higher productivity and hence higher growth. Similar to previous studies, this study implies the importance of export

sophistication on the strong and sustainable growth of countries. The policy implication of this fact is that developing countries should aim to produce sophisticated products to be competitive and to converge to the level of per capita income of developed countries. Studies like Criscuolo et. al. (2019), Juhász (2018) and Brinkerhoff and Brinkerhoff (2011) find strong evidence on the role of industrial policy or technology and innovation policy in fostering sophisticated high technology products for different countries. Indeed, the success of today's developed countries in the production of high technology products like Germany, Japan or USA is also based on protectionism and government interventions with industrial plans. Chang (2002) or Mazzucato (2013) well documents the role of government interventions and industrial plans for developed countries in achieving to produce high value added and sophisticated products. For example, Naqvi, Henow, and Chang (2018) discuss the major role of German Development Bank KfW in supporting sophisticated products since the reconstruction of Germany after World War II.

Any MENA country should not be expected to fully copy the policies that have been implemented by countries achieved to produce high technology products. The essence of the policies is public-private partnership within the framework of industrial planning. This should be adapted in line with economic and social structure of the country. Besides, inclusiveness and sustainability can be incorporated to these policies. Inclusiveness can be achieved by Initial Public Offerings (IPO) of public – private partnerships to public in a transparent mechanism. This may help enhancing the public support to industrial policies. Last but not least, achieving 2030 sustainability goals of United Nations may open new channels of finance to these industrial policies.

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Appendix

Table A.1.: SITC4 (Rev.2) Products above 1 Billion US Dollars Export Value

COUNTRY CODE	Global Rank	SITC4	Product	Export Value (Billion US$)	ECI	Export share (%)
ARE	4	9710	Gold	15.926	0.184	5.42
ARE	6	6672	Diamonds	12.259	0.356	9.63
ARE	3	8973	Precious Jewellery	11.817	0.544	11.65
ARE	20	7810	Cars	4.499	0.592	0.68
ARE	3	6841	Aluminum	4.219	0.311	11.99
ARE	8	7643	TV and Radio Transmitters	3.169	0.686	1.64
ARE	4	5831	Polyethylene	2.988	0.553	5.75
ARE	11	7929	Aircraft Parts and Accessories	1.625	0.565	2.11
ARE	1	7131	Internal Combustion Engines for Aircraft	1.618	0.274	42.93
ARE	10	6822	Processed Copper	1.075	0.504	3.18
ARE	26	7849	Vehicles Parts and Accessories	1.074	0.666	0.32
ARE	17	5530	Perfumery and Cosmetics	1.032	0.493	1.29
ARE	11	8928	Miscellaneous Printed Matter	1.019	0.542	3.59
DZA	8	3330	Crude Petroleum	11.279	0.305	4.27
DZA	4	3414	Petroleum Gases	6.424	0.452	13.64
DZA	3	3413	Liquified Petroleum Gases	5.362	0.308	11.80
EGY	17	9710	Gold	2.646	0.184	0.90
EGY	17	3330	Crude Petroleum	1.808	0.305	0.68
ISR	4	6672	Diamonds	15.623	0.356	12.28
ISR	4	5417	Medicaments	6.366	0.545	2.12
ISR	12	7764	Electronic Microcircuits	3.001	0.794	0.78
ISR	11	7788	Miscellaneous Electrical Machinery	1.836	0.725	1.95
ISR	15	8720	Medical Instruments	1.186	0.552	1.30
ISR	18	5989	Chemical Products	1.144	0.569	1.19
JOR	12	8459	Miscellaneous Knitted Outerwear	1.204	0.278	2.09
MAR	23	7810	Cars	2.947	0.592	0.45
MAR	10	7731	Electric Wire	2.459	0.383	2.65
MAR	4	5629	Miscellaneous Fertilizers	1.827	0.350	11.25
MAR	2	5222	Inorganic Acids and Oxygen Compounds	1.146	0.350	14.89
QAT	1	3413	Liquified Petroleum Gases	47.983	0.306	46.41
QAT	12	3330	Crude Petroleum	10.402	0.249	2.70
QAT	9	9310	Unclassified Transactions	8.539	0.588	2.24
SAU	1	5831	Polyethylene	8.062	0.611	11.78
SAU	1	5832	Polypropylene	5.115	0.518	16.40
SAU	1	5161	Ethers and Acetals	4.188	0.709	24.17
SAU	4	5121	Acyclic Alcohols	2.267	0.404	7.82

SAU	4	7938	Miscellaneous Boats and Floating Structures	2.157	0.432	5.26
SAU	6	5112	Cyclic Hydrocarbons	1.694	0.720	4.91
SAU	4	5225	Inorganic Bases	1.310	0.402	9.36
SAU	9	6841	Aluminum	1.132	0.401	2.69
SAU	4	5621	Nitrogenous Fertilizers	1.054	0.405	5.21
TUN	18	7731	Electric Wire	1.395	0.383	1.51
TUR	15	7810	Cars	8.319	0.592	1.26
TUR	8	9710	Gold	8.247	0.184	2.81
TUR	8	7821	Trucks and Vans	4.574	0.521	4.38
TUR	19	7849	Vehicles Parts and Accessories	3.811	0.666	1.14
TUR	11	8973	Precious Jewellery	3.758	0.544	3.71
TUR	2	6732	Iron Bars and Rods	2.781	0.420	8.83
TUR	3	8462	Cotton Undergarments	2.070	0.313	6.80
TUR	6	8459	Miscellaneous Knitted Outerwear	1.810	0.278	3.15
TUR	7	8439	Miscellaneous Feminine Outerwear	1.781	0.326	4.06
TUR	1	6595	Miscellaneous Man-Made Carpets	1.771	0.502	23.92
TUR	18	9310	Unclassified Transactions	1.750	0.452	0.42
TUR	16	7731	Electric Wire	1.655	0.383	1.79
TUR	5	8451	Knitted Outerwear	1.613	0.336	4.19
TUR	10	7139	Piston Engine Parts	1.533	0.607	2.69
TUR	2	8463	Synthetic Knitted Undergarments	1.518	0.305	7.03
TUR	3	7831	Public Passenger Vehicles	1.500	0.452	10.34
TUR	4	6552	Natural Knitted Fibric	1.476	0.443	5.77
TUR	12	6842	Processed Aluminium	1.400	0.489	2.48
TUR	10	7611	Color TVs	1.400	0.492	1.97
TUR	2	577	Nuts	1.363	0.231	7.08
TUR	18	8939	Miscellaneous Articles of Plastic	1.307	0.518	1.35
TUR	4	7752	Household Refrigeration	1.267	0.489	7.44
TUR	10	8219	Miscellaneous Furniture	1.260	0.469	1.81
TUR	4	6584	Linens	1.249	0.328	5.19
TUR	4	8423	Men's Pants	1.231	0.316	5.00
TUR	3	7751	Washing Machines	1.151	0.495	12.37
TUR	1	460	Wheat Flour	1.093	0.298	23.73
TUR	22	7721	Circuit Breakers and Panels	1.062	0.615	0.61

Note: For Saudi Arabia and Qatar, year 2015 is the recent data available. For the rest, year 2016 is used.