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Empirical Analysis of the Determinants of Structural Transformation in the MENA Region

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Abstract

The purpose of this article is to establish an empirical link between the determinants of structural change and a set of economic variables proposed in theoretical and empirical literature. Our prediction was for structural change due to the diversification and sophistication of exportation. To do this, we use a generalized method of the moments dynamic panel regression technique to identify the key fundamentals of export sophistication and diversification in certain *economies in the Middle East and North Africa region over the period 2000–2017. Empirical findings show a positive relationship between export sophistication and foreign direct investment, financial openness, human capital, infrastructure, and institutional quality. At the same time, there is a positive link between diversification, trade openness, human capital, population, and infrastructure. Nevertheless, the results suggest that countries in the MENA region must put in place policies that focus on developing human capital and strengthening education, facilitating all forms of trade and transactions, and improving the quality of their institutions.

Keywords: Diversification and sophistication of exportation MENA countries, structural transformation.

Jel: F14, L16

1. Introduction

The economy of today is based on opening and reducing trade restrictions, so a country cannot limit itself to exporting traditional products. To assist developing countries in achieving sustainable and dynamic growth, they must be integrated into global value chains that are dominated by sophisticated, high-added-value products. The processes regulating these structural changes are being called into question (UNCTAD, 2013). These are reflected in long-term adjustments affecting the sectoral and geographic mix of the economic system, as well as in adjustments to its institutions and supporting infrastructures. No nation can sustainably achieve GDP growth rates without a structural shift in the economic sectors (African Development Bank, 2019).

Structural change has become the most significant topic and has become

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the foundation of major research areas in development economics. It relies on shifting surplus labor from traditional to modern industries and the factors that influence economic modernization in developing nations (UNCTAD, 2016). It notes that over the past 20 years, the process has advanced to a new stage. In most emerging nations, particularly in the MENA countries where such development has not occurred, it is still in its infancy. The road to development is paved with obstacles. Currently, the MENA region is at the center of economic challenges, primarily regional integration and transformation. Numerous researchers have put this process at the forefront of understanding economic development and emphasized the positive impact of export structure on economic growth through multiple indicators. For instance, Chenery and Taylor (1968), Kaldor (1967), and Kuznets (1966) examined the mechanisms that made it possible for conventional economies, particularly agricultural economies, to change into modern industrial economies. Redistributing production elements from the conventional agriculture sector's low productivity to the sector's high productivity and growing returns is the foundation of economic modernization. This redistribution occurs through the transfer of resources from agriculture to industry and services (World Bank, 2020). Hausman and al. (2007), Vu (2017), Serigne and Fousséni (2019), Busse and al. (2019), and Chen and Xi (2019) provide the importance of structural change for economic development. The shares of total employment and total value-added sectors, as well as the diversification and sophistication of exports, allow us to measure and prove this process. Furthermore, structural change theory has upheld the principle of production diversification from primary to secondary and tertiary industries. International trade theory defends product specialization and sophistication, in which a country has a comparative advantage, even those corresponding to large-scale activities.

Special forms of industrial policy have therefore become necessary for the emergence of new, more diversified, and more demanding activities. States should therefore intervene by supporting institutions, adopting policies that align resources with strategic sectors, and imposing discipline on the private sector to bring about sustainable structural change in the economy.

Most MENA countries have introduced growth-enhancing reforms and industrial policies in the last decade. It has a fair share of natural resources. This region is one of the wealthiest countries in the world as far as natural resources are concerned. It has over 60% of the confirmed global oil and energy reserves. Therefore, over 85% of exports can facilitate trade and investment (OECD, 2016). Extensive economic literature suggests that such dependence may negatively affect a country's likelihood of growth and job creation, thereby reducing opportunities for economic diversification and sophistication. The main reason for choosing MENA countries to conduct our empirical survey is that there are no studies of this region. In addition, a forthcoming World Bank publication explores how the MENA region can meet this challenge and encourage economic diversification and sophistication. In this context, stylized facts about the structural transformation factors require more attention in the analysis of sustainability and identification of these determinants to propose political measures to push them.

Furthermore, this work aims to fill empirical gaps in the existing literature and contribute

to the debate on the political economy of the determinants of structural change. It specifically examines the relationship between international openness, human capital, infrastructure, and the concentration and complexity of exports, then examines the role of institutions in determining the latter's relationship with panels in MENA countries. To do this, we use the Generalized Method of Moments (GMM) to identify the major underpinnings of transformation and to what extent this affects the countries studied. This paper aims to contribute to the literature by providing evidence from the MENA region that may help policymakers implement laws to foster economic transformation.

The rest of the paper is organized as follows. Section 2 presents the empirical review. Section 3 presents the method of analysis and the data used. Section 4 discusses the empirical results, while section 5 concludes with a discussion of policy implications.

2. Review of Empirical Literature

The predictions of theoretical models and prior empirical studies are the basis for the determinants of diversification and sophistication presented in this section. We suggest other potential factors that are linked to the countries being studied. The main determinants are foreign direct investment, both commercial and financial openness, the infrastructure, the distance from the market, the size of the economy, and the human capital, added to the institutional and governance factors.

Foreign direct investment (FDI) is beneficial for both the supplying and receiving countries. In most cases, it appears to be one of the main catalysts for development and a vector for transferring wealth and knowledge from one country to another. This will stimulate growth in the host countries that benefit from FDI and help them grow further (UNCTAD, 2013). There are econometric studies, such as those done by Iwamoto et Nabeshima (2012), Lectard (2017), and Gamariel et al. (2022), suggesting that FDI can promote diversification by investing in new products. Concerning the level of sophistication, Harding et al (2011), Zhu et Fu (2013), and Li (2021) identify a positive effect of FDI liberalization on manufacturing export sophistication.

In a Melitz context, financial liberalization can reduce liquidity barriers and, as a result, lead to an increase in exporters and varieties produced (positive impacts on the drivers of structural change) (UN, 2013). However, financial liberalization can be detrimental. According to Alemu (2009), subsidies increase the cost of non-traded commodities, which raises real exchange rates and reduces export competitiveness. However, few studies have examined the relationship between financial openness, export sophistication, and export diversification. Using panel data from 120 economies during 1996–2016, Yu et Qayyum (2023) show that the enhancement of overall financial openness could increase economic complexity significantly. The UN (2013) highlights that financial openness has a positive effect on diversification and a negative effect on sophistication.

By removing trade barriers, enabling more businesses to access international markets, and cutting transaction costs, trade openness can also have a favorable effect on export diversification and sophistication (Agosin et al., 2012; Makhlouf et al., 2015; Péridy et al., 2016). Phuc et Dinh (2021) investigated the influences of trade openness and FDI inflows on the domestic economic complexity of 40 selected developing countries from 2002 to

2017. They indicate that trade openness has a positive impact on economic complexity. In a similar vein, Onchamnyo and Akame (2016) revealed that overall export diversification is significantly promoted and determined by trade openness, using an analysis of panel data for a set of 32 countries in Sub-Saharan Africa (SSA) over the period 1995 to 2013.

The net official development assistance (ODA) that is received (% of GNI) can help recipient countries diversify their economies by providing financial resources to develop different sectors beyond their traditional industries. According to the UN's 2013 findings, ODA can contribute to diversification in the North African country, but it may not necessarily lead to export sophistication. In a more recent paper, Gnangnon S. (2019) has shown a positive impact of the cumulative Aid-for-Trade flows on the export product diversification path of 104 countries over the period 2002–2015. Kim (2019) tries to determine the link between aid for trade and the export structure of 133 aid recipients from 1996 to 2013. He used the Herfindahl-Hirschman Index to measure export concentration, and the findings suggest that total trade aid has decreased the concentration level in the short run.

One of the most cited determinants of sophistication and diversification is human capital. Indeed, workforce skill levels and commitment to education should significantly impact a country's ability to diversify and improve the quality and sophistication of its exports. According to Romer (1990), economies with large capital stocks illustrate higher growth. A few studies have examined the relationship between export diversification and education. Cabral and Veiga (2010) mention that primary and tertiary education strongly and positively affect diversification. Oliveira (2020) examines the dynamics of Brazilian export diversification between 2003 and 2013. The results suggest that higher levels of education are expected to foster the development of a skilled labor force, which in turn fosters both successful exports and diversification. Zhu and Fu (2013) admit that human capital positively impacts export sophistication in low- and middle-income countries. Similarly, Nguyen et al. (2020) highlighted the importance of human capital in 40 developing countries from 2002 to 2017 using a generalized two-step system. They demonstrate that investing in human capital can alleviate the effects of foreign direct investment inflows on economic complexity. Rivera et al. (2023) showed that human capital, globalization, and the role of the government were determining factors in the productive matrix of sophisticated export countries in Latin America from 1996 to 2018.

Proximity to large markets has been expected to increase export diversification by supplying a market for various goods and services and diminishing transportation costs. Cadot et al. (2011) validate that the exports from isolated countries are not evenly distributed. Only a few types of products are exported by these countries. Dennis and Shepherd (2005) show that export diversification decreases as a country's distance from Germany increases. Parteka and Tamberi (2008) found that the distance from major markets (New York, Rotterdam, and Tokyo) is a significant factor in export diversification. Low-income countries will remain low in demand if a country doesn't export many products, resulting in a low level of export sophistication. The UN (2013) notes that distance and trade facilitation play an important and positive role in sophistication.

Infrastructure has also been considered as one of the factors associated with complexity and diversification. Yeaple and Golub (2007) find that different infrastructures (road, telephone, and energy) have a positive effect on the level of overall productivity and productive specialization. Alemu (2009) highlights that infrastructure is also positively associated with diversification. Lectard (2017) identifies that infrastructure, measured by mobile subscribers, facilitates sophistication exports. In more recent research, Rehman and Sohag (2023) use the ARDL technique to examine how the transport infrastructure affects the complexity and diversity of exports in 20th-century economies. The empirical results demonstrate that both short and long-term export sophistication and diversification are boosted by transportation infrastructure. The empirical findings demonstrated that transportation infrastructure increases export sophistication and diversification.

GDP per capita, a proxy for a nation's level of development, is now acknowledged as one of the key forces behind diversification. According to Elhiraika and Mbate (2014), rising GDP per capita may cause consumers' tastes to shift toward a wider range of goods. According to Oskawe et al.'s (2018) findings, using cross-country regressions, increased GDP per capita over the long term is linked to export diversification. Additionally, Swathi et Sridharan (2022) demonstrate that the region's GDP per capita significantly hindered countries' export diversification. To the best of our knowledge, no studies examine the relationship between GDP and sophistication.

It has also been proven that population plays a significant role in determining economic complexity and export diversification. Cabral and Veiga (2010) and Cadot et al. (2011) show that the larger the population, the more diversified the economy. Hausmann et al. (2007), Weldemicael (2012), and Zhu and Fu (2013) detect that the population positively influences the level of sophistication.

Another strand of literature identifies institutional quality as a key factor in export sophistication and diversification, as it positively correlates with productivity levels. Institute, political, and governance variables are important in measuring a country's ability to diversify and refine its export structure (UNCTAD, 2013; Rehamn et Sohag, 2022).

Studies by Cadot et al. (2012) and Parteka and Tamberi (2013) confirm the importance of institutions as determinants of export diversification. Berkowitz et al. (2006) demonstrate that countries with transparent regimes can produce and export more complex commodities while importing fewer complex commodities. Cabral and Veiga (2010) found a negative impact of anti-corruption and regulatory quality on export sophistication. Zhu and Fu (2013) show that institutions positively impact complexity in high-income countries, while the impact is negative in low- and middle-income countries. Cuberes and Jerzamnowski (2009) illustrate that non-democratic countries suffer from high sector concentration, which hinders the entry of new firms.

For robustness, we also include four additional variables, namely: unemployment, electricity, inflation, and participation in the global value chains. Recent economic studies indicate that the diversity of nations and the economic complexity index are indirectly related to both unemployment and economic growth (Ozayturk, 2020). To the best of our knowledge, no empirical studies have examined how economic complexity and diversification are impacted by unemployment. About electricity, Kamguia et al. (2023) show

a positive and statistically significant effect on the coefficient related to power infrastructure. Therefore, a 10% increase in electricity infrastructure leads to an improvement of approximately 1.027 percentage points in sophistication. The benefits of energy and transportation infrastructure for market access, capital productivity, and human capital formation theoretically explain these results (Banerjee et al., 2021). Odeh and Watts (2019) demonstrate how the infrastructure for wind, solar, and electricity enhances diversification. In a similar vein, Shepherd (2010) demonstrates how export diversification in poor nations is enhanced by lower transportation costs. Regarding inflation, it can be described in a variety of ways, but they all have some elements in common. According to Samuelson (2001), inflation is defined as a widespread increase in the prices of commodities, services, and factors of production. This meaning implies a fall in a country's currency's purchasing power, resulting in a decrease in its real worth. There is essentially no research on the influence of inflation on the complexity and variety of exports in countries with fixed or variable currency rates.

Some studies have investigated how GVC integration affects the technical complexity of industrial exports. According to Liu et al. (2015), when industry development focuses on functional upgrades and chain upgrades, GVC integration will prevent the technological complexity of industrial exports from increasing. According to Li et al.'s (2020) research, global value chain (GVC) integration can promote the technical complexity of equipment manufacturing industry exports. Jangam and Rath (2020) investigated 24 emerging market economies from 1995 to 2011 and discovered that involvement in GVCs promotes economic upgrading through increases in domestic value-added exports. Hung and Pak (2021) used a dataset comprising 134 countries from 2002 to 2018 to assess the influence of global value chain (GVC) membership on export diversification and discover that GVC involvement helps to diversify both export items and export partners.

To our knowledge, no study has addressed the case of countries in the MENA region. Such an attempt is the aim of this article. Furthermore, this study aims to fill the theoretical and empirical gaps in the existing literature and to contribute to the debate on the political economy of the determinants of structural change. Also, few studies empirically examine the relationship between institutional quality, value chain, electricity and structural change. To the best of our knowledge, no empirical studies have examined how economic complexity and diversification are impacted by unemployment and inflation.

3. Empirical Methodology and data

3.1. Variables and Data Sources

We use panel data from 20 MENA countries covering the period from 2008 to 2018, and we apply the Generalized Method of Moments (GMM) estimator proposed by Arellano and Bover (1995).

3.1.1. Dependent variable

There are various indicators used to measure the level of export sophistication and diversification in an economy.

We use the economic complexity index (ECI) of Harvard University's Atlas of Economic Complexity proposed by Hausmann and Hidalgo (2009) as the main export sophistication measure. The concept is that

richer countries' exports have qualities, such as sophisticated technology, which allow low-wage producers to compete in global markets (Lall et al., 2006). As a result, when a developing country exports items that are comparable to those of industrialized countries, its EXPY score rises (Weldemicael, 2012). ECI is used to calculate the indicators of ubiquity and diversity and to introduce the measurement of product complexity. However, ubiquity focuses on the number of countries that export a good whereas diversity is based on the number of products that a country exports. These two dimensions are complementary. They are calculated as follows:

$$\text{Ubiquity} = K_{k,0} = \sum_j M_{j,k}$$

$$\text{Diversity} = K_{j,0} = \sum_j M_{j,k}$$

Where j is the country, k is the product and $M_{j,k}$ is a dummy equal to 1 if the country j exports the product k with revealed comparative advantage and 0 otherwise.

In this study, we follow Hnain et al. (2023) and use the Herfindahl-Hirschman Index (HHI), which ranges from 0 to 1, to measure export concentration—an inverse indicator of diversification. It can be represented as follows:

$$\text{HHI} = \sum_{i=1}^{n} \left(\frac{x_i}{X}\right)^2$$

Where x_i represents the value of exports from countries of product i, X represents the value of all the local exports of the country and N represents the total number of export products.

3.1.2. Control variables

The set of variables incorporated into X_{it} includes determinants describing international openness, the geographic characteristics of economies, their factor endowments, and institutional factors that are theoretically assumed to have an impact on export diversification and sophistication in the MENA region. The definition of variables and their sources is denoted in Table 1. The descriptive statistics of the variables are summarized in Annex Table 2. These variables are chosen following the recent related literature (Zhu et Fu, 2013; Lectard, 2017; Li, 2021; Phuc et Dinh, 2021; Rehman et Sohad, 2022; Swathi. M & P. Sridharan, 2022).

Table 1. Data source and variable definition

Abbreviation	Variable	Source
FDI	FDI flows as % of GDP	UNCTAD
TO	Trade openness:(X+M)% GDP	WDI
FO	Financial openness: Domestic credit to the private sector % GDP	WDI
ODA	Net official development assistance (ODA) received (% of GNI)	WDI
POP	Population growth (annual %)	WDI
DIS	Distance index	CepiiGeoDist database
INF	Fixed telephone subscriptions (per 100 inhabitants)	WDI
HUM-CAP	School enrollment, tertiary (% gross) School enrollment, secondary (% gross) School enrolment, primary (% gross)	WDI

Abbreviation	Variable	Source
VA	Voice and Accountability	WGI
GOV	Government Effectiveness	WGI
RQ	Regulatory quality	WGI
RL	Rule of law	WGI
GDP	GDP per capita growth (annual %)	WDI
UNEM	Unemployment, total (% of total labor force)	WDI
ELC	Access to electricity (% of population)	WDI
INF	Inflation, consumer prices (annual %)	WDI
Fva	Foreign added value (Measure of **GVC Participation**)	UNCTAD-EORA

FDI: It is difficult to predict how foreign direct investment will affect export modernization. The effects of foreign direct investment are not automatic. Even if the process of structural change can be facilitated, it arises from the characteristics of his FDI about the host country (Lectard, 2017). It contributes to the diversification and refinement of exports only if it has sufficient capacity to assimilate the technology and information transmitted in the host country. FDI facilitates productive transformation either directly through its existence or indirectly through its diffusion effect. Also, FDI can improve the export of more sophisticated goods and services (Saadi, 2020).

Trade openness: In the traditional framework of international trade theory, openness implies specialization for comparative advantage. Trade openness encourages the least developed countries to diversify and specialize in less complex products. Onchamnyo and Akame (2016) show the importance of trade openness in promoting export diversification. Phuc et Dinh (2021) show the importance of trade openness in promoting export sophistication.

Financial openness: Financial liberalization increases the number and variety of exports by easing liquidity constraints. However, this liberalization may adversely impact export diversification and exportation due to its impact on real exchange rates. Studies by Yu and Qayyum (2023) suggest that financial openness can foster greater economic complexity.

ODA can bring greater diversification and sophistication to exports if appropriate policies are followed. In addition, Gnangnon S. (2019) highlights the role of ODA in increasing export diversification and Kim (2019) highlights this role in increasing the complexity of exports.

Infrastructure: market access (distance to market) and economic size. Indeed, developing countries' low trade participation rates can be explained by weak transport and telecommunication infrastructures. Upgrading infrastructure in all countries would reduce production costs and increase efficiency and productivity, thereby maximizing profitability. Malah et Asongu (2022) show the positive effects of infrastructure on structural change. So, we then expect a positive effect on export diversification and sophistication.

Transport costs and distance affect a country's specialization level in the new geographical economy. Thus, a lower distance to major world markets, access to the sea,

and overall lower transport costs determine the ease with which a country can increase the diversity of products exported to world markets. According to Rehman and Sohag (2022), transportation infrastructure increases export sophistication and diversification in the short and long run.

The size of the economy implies an increase in the number of exporting firms in a sector as well as the number of varieties exported. It then accelerates the growth of exports on an extensive and intensive margin. Therefore, a positive effect on the modernization of exports in general can be expected. We estimate country size based on population density. Work demonstrates that the size of the economy is likely to affect the production and export of complex items due to the labor force and the demand it represents (Lapatinas,2019)

Human capital, represented by primary, secondary, and tertiary gross enrolment ratios, is expected to incite export diversification by increasing the availability of skilled labor for new and innovative investments. So ample human capital makes it easier for the country to develop new products and include ideas found elsewhere. Research indicates that the workforce's skill level and educational initiatives are anticipated to have a major influence on each nation's capacity to increase exports (Nguyen et al.,2020; Oliveira,2020)

Institutional factors: Several indicators describe the quality of institutions. However, our analysis will use four indicators: voice and accountability, government effectiveness, regulatory quality, and rule of law. The indicator varies from 2.5, meaning a weak regime, to +2.5, indicating a regime with strong governance performance. They are all intended to lower export diversification and sophistication. Vu (2019;2020) demonstrates that institutions influence economic complexity by driving human capital build-up and enhancing incentives for innovative activity. Parteka and Tamberi (2013) confirm the importance of institutions as determinants of export diversification.

GDP per capita: a proxy for a nation's level of development, is now acknowledged as one of the key forces behind diversification. According to Elhiraika and Mbate (2014), rising GDP per capita may cause consumers' tastes to shift toward a wider range of goods. The findings of Oskawe et al. (2018), based on cross-country regressions, indicate a positive long-term relationship between GDP per capita and export diversification. Additionally, Swathi et Sridharan (2022) demonstrate that the region's GDP per capita significantly hinders countries' export diversification. To the best of our knowledge, no studies examine the relationship between GDP and sophistication.

For robustness, we also include four additional variables.

Unemployment: Unemployment can contribute to economic stagnation by limiting productivity, diversification of sectors, and the adaptability of the economy to changes. According to the Keynesian perspective, unemployment often results from an insufficiency of aggregate demand in the economy. High unemployment can lead to lower production, reduced diversification of industries, and underutilization of productive capacities. Then we expect a negative impact of unemployment on the sophistication and diversification of exports.

Electricity: few studies examine the effects of different infrastructures such as electricity. Electricity plays a crucial role in economic development, complexity, and diversification of economic activities. Electricity provides a

reliable and versatile source of energy, which boosts industrial production. Businesses can use electricity to power machines, tools, and equipment, promoting more efficient and diverse production. Also, access to a stable power supply encourages technological innovation. Then we expect a positive effect of electricity on exports. This is the same idea as previous studies (Odeh and Watts,2019; Kamguia et al.,2023).

Inflation: In a changing economic climate, moderate inflation might push businesses to innovate to sustain profitability. Companies may be pushed to develop new technologies, enhance operational efficiencies, and introduce new goods to remain competitive when production costs rise. Companies can also be encouraged to innovate to remain competitive. This can lead to technology advancements and product and service diversity, increasing economic complexity. Then we anticipate that inflation will have a favorable effect.

GVC Participation: It is accepted in the literature that participation in GVCs contributes to the diversification and sophistication of export products (Jangam and Rath,2020; Hung and Pak, 2021)

Table 2. Descriptive statistics

Variables	Number of observations	Mean	Standard deviation	Minimum	Maximum
ECI	360	-0.444	0.659	-2.430	0.990
HHI	348	0.416	0.232	0.0686	0.902
FDI	343	0.0489	0.126	-0.427	1.885
TO	359	0.838	0.349	0.191	1.919
FO	360	0.478	0.429	0.123	2.533
ODA	253	0.0257	0.0362	-0.00101	0.263
POP	360	2,4040	0.608	-9,080	17,51
DIS	360	1.146	1.160	0.0303	5.440
TEL	360	0.166	0.116	0.00306	0.635
HUM-PRI	319	0.954	0.241	0.003	1.206
HUM-SEC	268	0.708	0.325	0.0005	1.102
HUM-TER	345	0.291	0.174	0.0102	0.976
VA	340	-0.842	0.656	-1.983	1.117
GOV	340	-0.0706	0.694	-1.892	1.564
RQ	340	-0.117	0.785	-2.274	1.423
RL	340	-0.141	0.672	-1.817	1.216
GDP	360	0.0229	0.0903	-0.624	1.218
UNEM	360	0,0938	0,0014	0,2977	0,05815
ELC	360	0,91622	0,182	1	0,20372
INF	359	0,07392	0,25958	0,5298	0,10724
Fva	306	0.152	0.027	0.33	0.075

3.2. Methodology

The dynamic aspect of the structural transformation process and the presence of endogenous explanatory variables serve as the foundation for the empirical research. Oskawe et al.'s (2018) findings using cross-country regressions, increased GDP per capita over the long term is linked to export diversification. Numerous empirical studies (Agosin et al., 2012; Parteka and Tamberi, 2013; Zhu and Fu, 2013) emphasize the possibility of endogeneity of most explanatory variables regarding the reason of sophistication and diversification. In this specific case, we handle potential endogeneity by doing a two-step system GMM definition. Not only can the indignity of the lagged dependent variable be corrected using the GMM, but all of the explanatory factors can be as well. Sargan/ Hansen over-identification tests and the second-order serial correlation test are used to confirm the validity of the usage of lagged variables as instruments and the efficiency of the GMM estimator. The AR (2) test assumes that there is no second-order autocorrelation of the residuals, although the Hansen test's null hypothesis indicates that the instrumental variables are uncorrelated with the error term (Arellano and Bond, 1991).

As a result, we develop the dynamic model that follows:

$$SOPH_{i,t} = \alpha + \beta_1 SOPH_{i,t-1} + \beta_2 X_{i,t} + U_i + V_t + \varepsilon_{i,t} \quad (1)$$

Where $SOPH_{i,}$ is the export sophistication for country I in period t, $SOPH_{i,t-1}$ is the lagged value of $SOPH_{i,t}$, X_{it} is the vector of baseline controls variables, U_i represents the specific country effect, V_t represents the specific temporal effect, and ε_{it} is the error term.

$$DIVE_{i,t} = \alpha + \beta_1 DIVE_{i,t-1} + \beta_2 X_{i,t} + U_i + V_t + \varepsilon_{i,t} \quad (2)$$

Where $DIVE_{i,t}$ is the export diversification for country i in period t, $DIVE_{i,t-1}$ is the lagged value of $DIVE_{i,t}$, X_{it} is the vector of baseline controls variables, U_i represents the specific country effect, V_t represents the specific temporal effect, and ε_{it} is the error term.

4. Empirical results and discussion

Our empirical study is based on an unbalanced panel of 20 countries in the MENA [1] region and covers the period 2000–2017. As well as on the dynamic dimension of structural change processes and the presence of endogenous explanatory variables. Therefore, modeling with dynamic panel data can introduce an endogenous variable delayed by a few lags as an explanatory variable. In this case, the estimates obtained from ordinary least squares (OLS) and generalized least squares (GLS) are biased and do not converge. In the same context, these estimators do not address the issue of simultaneity and causality between explanatory and dependent variables, nor do they address heterogeneity bias. Additionally, some explanatory variables are endogenous. This endogeneity bias is primarily due to the problem of reverse causality. Therefore, only the GMM regression results are shown in the following table. During this work, we confirmed the stability and robustness of our results based on Hansen and Arellano bond tests. Empirical studies examining the determinants have provided little detail on likely endogenous variables, and they do not always address the same variables as endogenous ones.

Additionally, we utilize the xtabond2 command that was created by Roodman (2006), which makes GMM easier to use and more accessible. However, this estimator is analyzed

as a black box. The stability and robustness of the results are confirmed by using Hansen and Arellano-Bond tests. Empirical studies that examine the determinants of structural change have provided little insight into probable endogenous variables, and they do not always address the same variables as endogenous.

4.1. Export sophistication

As previously mentioned, we are uncertain about the endogeneity of any particular variable. The lag of the ECI and FDI flow variables (all columns) is utilized to correct the variable endogeneity bias and estimate the drivers of the complexity dimension. In columns 2 and 3, trade openness, financial openness, and higher education were introduced as endogenous factors.

To check the robustness of our results, we introduce control variables that have been considered in the literature. Education is a key factor for innovation and the ability to use new technologies, and thus for technological progress, a driving force for structural change. We also decompose the educational variables according to school level Primary in column (1), secondary in column (2), and tertiary in column (3). GDP growth per capita (annual%) is added to the fourth column. In column 5, we add the variable dummy oil. Finally, in column 6, we replaced primary education with tertiary education.

The main hypothesis of our study is that institutional, political, and governance variables play important roles in explaining the ability of MENA countries to promote the diversification and refinement of their export structures successfully. Therefore, we included governance variables in the regression: government effectiveness, voice and accountability, regulatory quality, and rule of law. ECI, IDE, and educational variable lags are treated as endogenous. Tables 3 and 4 show the results of export sophistication.

The coefficient lagged values of economic complexity are positive. This suggests that there is a degree of persistence in economic complexity in MENA countries. In other words, if economic complexity has increased in the past, it is likely to continue increasing in the present or future.

The coefficient of FDI is positive and statistically significant. The findings by Osinubi et al. (2022) agree with this result. These authors demonstrate that foreign direct investment has a positive impact on economic complexity in all countries, including MINT countries, through panel co-integration regression. Yamato et al. (2012) and Oszoy et al. (2021) report that FDI stock has a positive impact on export sophistication.

Trade openness does not have a positive effect on sophistication. MENA countries' specialization justifies this negative role of trade opening in less complex products. Phuc et Dinh (2021) investigated the influences of trade openness and FDI inflows on domestic economic complexity.

Financial openness, which means reducing government controls on financial markets and enabling more private sector organizations to participate, has been a prominent policy orientation in several MENA nations during the last few decades. Financial liberalization can help these countries improve their economic sophistication and complexity by encouraging a more dynamic and efficient financial sector. The findings of Nguyen et al. (2020) are in line with our results. They show a long-term equilibrium relationship between economic complexity and international financial development, which is considered an aspect of economic globalization. However, our result contradicts the findings of the UNCTAD (2013), which found that financial openness does not appear to influence the sophistication of the exports of the NACs.

Table 3. GMM estimation of the determinants of export sophistication (2000-2017)

Variables	(1)	(2)	(3)	(4)	(5)	(6)
L.	0.343*** (0.061)	0.517*** (0.183)	0.468*** (0.087)	0.3414** (0.1412)	0.248* (0.139)	0.500** (0.189)
FDI	1.445* (0.763)	0.170 (1.659)	0.518** (0.264)	4.292*** (0.898)	3.751** (1.774)	4.018** (1.471)
TO	-0.539** (0.237)	-1.588*** (0.467)	0.104 (0.354)	-0.743** (0.3384)	-1.033** (0.431)	-1.271*** (0.426)
FO	0.769*** (0.206)	0.439 (0.426)	0.602*** (0.210)	0.933*** (0.231)	0.9239*** (0.256)	1.276*** (0.300)
ODA	0.487 (1.097)	-13.06** (6.229)	0.964 (0.766)	-1.376 (1.026)	-1.612 (0.172)	-0.413 (1.080)
HUM-PRI	0.348** (0.176)			0.265 (0.225)	-0.051 (0.262)	
HUM-SEC		0.012 (0.256)				
HUM-TER			0.223** (0.109)			-1.725*** (0.402)
DIS	0.035 (0.033)	0.174** (0.069)	0.021 (0.033)	0.064 (0.049)	0.046 (0.064)	0.0961* (0.0470)
POP	-0.247* (0.136)	-1.035*** (0.325)	0.0605 (0.127)	-0.358*** (0.115)	-0.326** (0.165)	-0.308*** (0.100)
TEL	1.274 (1.032)	-0.719 (0.998)	0.983** (0.396)	0.661 (0.522)	1.484* (0.855)	2.478*** (0.512)
GDP				-0.6802** (0.291)		
Dummy oil rent					-0.302* (0.172)	-0.0350 (0.189)
Constant	0.946 (1.152)	8.460*** (2.739)	-1.290 (1.035)	1.906* (1.001)	2.156 (1.391)	2.380*** (0.716)
Obs Number of groups	200 16	162 13	214 17	200 16	200 16	214 16
Number of instruments	18	20	18	20	19	21
AR2	0.115	0.185	0.108	0.477	0.754	0.104
Hansen test	0.593	0.981	0.408	0.659	0.968	0.619
Fisher test (p-value)	0.000	0.000	0.000	0.000	0.000	0.000

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 4. The relationship between export sophistication and institutional quality.

Variables	(1)	(2)	(3)	(4)
L.	0.387* (0.199)	0.443** (0.223)	0.512*** (0.113)	0.825*** (0.177)
FDI	4.159** (1.498)	4.169*** (1.601)	-2.368* (1.235)	0.563 (1.409)
TO	-0.871** (0.389)	0.623* (0.372)	0.0260 (0.133)	2.923* (1.597)
FO	1.244** (0.435)	1.329*** (0.393)	0.116 (0.223)	-0.836 (0.565)
ODA	1.781 (1.005)	3.212** (1.262)	-0.412 (0.932)	4.97* (2.471)
HUM-TER	-1.181** (0.471)	-1.052** (0.441)	0.394 (0.495)	-0.874 (0.659)
DIS	0.0552 (0.0692)	0.007 (0.527)	0.0412 (0.0249)	-0.158 (0.101)
POP	0.152 (0.394)	0.357 (0.288)	0.0114 (0.0644)	2.193* (1.098)
TEL	2.887*** (0.934)	2.863*** (0.880)	0.304 (0.518)	2.659* (1.299)
Dummy oil	0.218 (0.317)	0.343 (0.241)	-0.210* (0.118)	0.105 (0.120)
VA	0.348* (0.165)			
GOV		0.273** (0.1333)		
RQ			0.216* (0.102)	
RL				0.539** (0.193)
Constant	-1.452 (0.697)	-3.295 (2.751)	-0.321 (0.507)	-1.80** (0.812)
Obs Nombre groupe	202 16	202 16	202 16	202 16
Nombre d'instruments	20	19	20	19
AR2	0.176	0.306	0.160	0.306
Hansen test	0.971	0.965	0.822	0.999
Fisher (p-value)	0.00	0.000	0.000	0.000

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Regarding the role of ODA, we cannot find a significant effect of ODA, indicating that the MENA region cannot benefit from ODA. This is not surprising for this country group because many MENA countries have economic structures heavily dependent on natural resources, particularly oil and gas (Amouzay et al., 2023). These sectors tend to dominate exports due to their high profitability. Achieving export sophistication often requires significant structural changes in the economy, which may be difficult to achieve through ODA alone.

The impact of human capital on export sophistication depends on the level of education. Primary education has a positive effect. Secondary education is not significant. Tertiary education has a negative effect. Therefore, countries in the MENA region need to strengthen their education and research policies to enable accelerated economic development. These results are like those of Yalta and Yalta (2021), who find that tertiary education does not play a significant role in economic complexity, while primary and secondary education do.

Distance to the market has a crucial effect on export sophistication. This effect can be explained by the fact that some MENA countries are situated near major global markets. Egypt and Turkey are examples of countries in the eastern part of the region that benefit from their proximity to Europe, a massive consumer market. Accessing these markets is easier for these countries due to their relatively shorter distances from key European trading partners. MENA countries that are geographically distant from major markets may have trouble competing in mass markets due to higher transportation costs and other trade barriers. In response, they may focus on specialized, niche markets where they can develop unique and high-value products to cater to specific consumer preferences. This specialization can lead to greater sophistication in the products they offer. To improve connectivity and reduce the impact of geographical distance, some MENA countries have made significant investments in transportation infrastructure, including ports, airports, and highways. These investments can mitigate the challenges posed by long distances to markets in Baysoy and Altug (2021). Indeed, infrastructure in Mena countries positively impacts the sophistication of exports.

The level of development is significant but negative. This indicates that MENA countries still have low levels of GDP that do not allow them to reach a high level of sophistication. This effect can be explained by the fact that low GDP levels often imply limited economic resources available for investment in research and development, innovation, and the adoption of advanced technologies. These resources are critical for enhancing the sophistication of exported goods and services.

As far as the population is concerned, this has a negative effect. This result contradicts those of Weldemicael (2012) and Zhu et al. (2013). The urban-rural divide can explain this in these MENA countries, where a central power controls trade. This makes rural people unable to work and be productive.

Institutional variables have a positive and statistically significant effect. Therefore, the quality of institutions in MENA countries is sufficient to protect intellectual property rights and create an environment where businesses are more likely to invest in research and development, innovation, and the creation of sophisticated products. They can have confidence that their intellectual property will be safeguarded.

The dummy oil variable hurts sophistication. It allows us to conclude that the sophistication of exports is low in oil-exporting countries.

4.2. Export diversification

As we have already pointed out, the uncertainty of the endogeneity of certain variables explains the variables FDI and education in the estimation of the determinants of the diversification dimension. Endogenous variables are measured by their lags. To check robustness, we introduce control variables considered in the literature.

We decompose the education variable by levels of schooling: primary column (1), secondary column (2), and tertiary column (3). The growth of GDP per capita (annual %) is added in the 4th column. In column 5, we add the variable dummy oil. Finally, we replace primary education with tertiary education in column 6. We also include institutional variables. Tables 5 and 6 show the results of export diversification.

The estimation results show that the coefficient-lag values of economic complexity are positive. This corresponds to a negative parameter, as the variable explained is his HHI concentration index. This indicates that past levels of diversification have not positively influenced current or future levels of diversification in MENA countries. In other words, historical efforts to diversify the economy have not led to sustained diversification trends.

The results prove that FDI has a positive effect on diversification. This corresponds to a negative parameter, as the variable explained is the HHI concentration index. This is explained by inadequate technology and information absorptive capacity in the countries of the MENA region. The region still attracts limited foreign direct investment. Indeed, these flows have been trending negatively since 2009, confirming that political stability is a major concern for foreign investment. The results are consistent with the previous conclusion of Bari et Amzil (2023), who find a negative influence of FDI on the diversification of Moroccan exports but contradict the studies of Gamariel et al. (2022), who assert that FDI's impact on export diversification is reinforced by better access to infrastructure and fiscal incentives for foreign investors in special economic zones.

The findings demonstrate that financial openness has the potential to reduce export diversification. One probable explanation is that many MENA nations rely substantially on oil and gas exports, which may dominate their economies. Financial liberalization may result in an excessive focus on the financial and real estate sectors to the detriment of other businesses if it is not complemented with diversification measures. These countries must make concerted attempts to diversify and invest in non-oil areas.

Our results confirm that openness can be positively associated with diversification. Similar results were obtained by Dennis and Shepherd (2011) and Makhlouf et al. (2015). They improved trade facilitation and enhanced export diversification in developing countries.

We find a positive effect of ODA on diversification. This outcome is consistent with the research of Gnangon (2019) and Kim (2019).

Human capital has a positive and significant effect. It appears to be a strong and positive determinant of export diversification. This finding is also related to the findings of Cabral and Veiga (2010) and Rivera et al. (2023).

Table 5. GMM estimation of the determinants of export diversification (2000-2017)

Variables	(1)	(2)	(3)	(4)	(5)	(6)
L.	0.472*** (0.108)	0.460*** (0.147)	0.392*** (0.104)	0.632*** (0.112)	0.386*** (0.127)	0.326*** (0.103)
FDI	3.102*** (1.191)	4.165*** (1.279)	2.551*** (0.395)	2.468 (1.649)	1.242** (0.583)	0.881** (0.834)
TO	0.954*** (0.293)	-0.646 (0.508)	-0.964*** (0.238)	-0.568* (0.293)	-0.228 (0.164)	-0.500 (0.230)
FO	0.705*** (0.168)	0.797*** (0.302)	1.067*** (0.175)	0.500** (0.217)	0.350 (0.242)	0.642** (0.178)
HUM-PRI	-0.264** (0.134)					-0.219** (0.107)
HUM-SEC		-0.224* (0.131)				
HUM-TER			-1.358*** (0.286)	-0.377 (0.465)	0.236** (0.121)	
DIS	0.055* (0.0292)	0.019 (0.021)	0.084*** (0.029)	0.0452* (0.024)	0.036* (0.021)	0.036 (0.023)
POP	0.256*** (0.0791)	0.010 (0.264)	-0.283*** (0.064)	-0.139* (0.0758)	-0.108 (0.091)	-0.190* (0.102)
TEL	0.462 (0.315)	1.419** (0.606)	2.663*** (0.616)	0.719 (0.651)	0.234 (0.380)	0.782 (0.493)
ODA	-0.831* (0.472)	3.897* (2.198)	0.153*** (0.405)	-0.802 (0.855)	-1.644* (0.740)	-1.062 (0.738)
GDP				-0.421** (0.185)		
Dummy oil rent					-0.274 (0.155)	-0.297 (0.111)
Constant	2.119*** (0.714)	-0.444 (2.153)	1.988*** (0.506)	0.989 (0.616)	0.519 (0.648)	1.463 (0.819)
Obs Number of groups	200 16	162 13	214 16	214 16	214 16	200 16
Number of instruments	17	20	17	18	16	18
AR2	0.984	0.248	0.187	0.136	0.167	0.142
Hansen test	0.395	0.994	0.670	0.210	0.738	0.957
Fisher test (p-value)	0.000	0.000	0.000	0.000	0.000	0.000

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 6. The relationship between export diversification and institutional quality

Variables	(1)	(2)	(3)	(4)
L.	0.301** (0.136)	0.326** (0.141)	0.437** (0.169)	0.825*** (0.177)
FDI	2.749* (1.537)	2.214 (1.528)	-0.212 (0.980)	0.422 (1.057)
TO	-0.624** (0.261)	-0.816** (0.413)	-0.418 (0.280)	2.192* (1.198)
FO	0.338** (0.170)	0.425** (0.175)	0.640* (0.345)	-0.627 (0.424)
HUM-TER	0.164 (0.119)	-0.317** (0.141)	-0.890** (0.397)	-0.655 (0.494)
DIS	0.080*** (0.022)	0.077** (0.039)	0.077 (0.048)	-0.119 (0.076)
POP	-0.152 (0.010)	-0.189* (0.107)	-0.079 (0.205)	1.645** (0.824)
TEL	0.194 (0.454)	0.499 (0.319)	1.717* (0.906)	1.994** (0.974)
ODA	-2.943*** (1.116)	-2.259** (1.078)	-1.816 (4.389)	8.229** (4.103)
DUMMY OIL	-0.152 (0.106)	-0.150 (0.760)	-0.118 (0.205)	0.0787 (0.090)
VA	0.308*** (0.094)			
GOV		0.355*** (0.119)		
RQ			0.119 (0.372)	
RL				0.405*** (0.145)
Constant	1.26 (0.816)	2.010* (1.061)	0.519 (1.527)	-3.352* (1.74)
Obs Number groupe	202 16	188 16	202 16	202 16
Number of instruments	17	17	20	21
AR2	0.979	0.759	0.118	0.306
Hansen test	0.748 0.000	0.516 0.000	0.997 0.000	0.999 0.000

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Distance to the market has a positive effect on export diversification. This outcome is consistent with the findings of Cadot et al. (2011), which support these claims. They submit that isolated nations export few product kinds and have weakly diversified exports, especially on the broad margin.

The level of development is also remarkable. The higher the GDP per capita, the more diverse the economy. This finding is consistent with the findings of Oskawe et al. (2018).

Subsequently, the variable measuring population representation appears with a negative and significant sign. This shows that the population positively influences the level of diversification.

Another interesting observation from the results is that institutional quality is not sufficient for the diversification of MENA exports. While a well-designed regulatory environment can foster sophistication, laws that are unduly complicated or onerous can impede diversification attempts. Small and fledgling enterprises may find it difficult to manage complex regulatory regimes, which limits their capacity to explore new markets and products.

The dummy oil variable has a positive impact on diversification. This indicates that oil-exporting countries have a higher diversification index than oil-importing countries. Institutional factors are insufficient to stimulate export development but not enough to diversify exports.

5. Robustness test results

To test the robustness of our baseline results, in this subsection, we include additional control variables. We re-estimate our model by introducing four additional control variables, namely: unemployment, electricity, inflation, and participation in the global value chains.

5.1. Export sophistication

The results of this estimation (additional variables and sophistication) are presented in Table 7. The results presented in this table indicate that our empirical findings are stable even after incorporating additional control variables. Furthermore, we find that access to electricity and integration into global value chains (GVCs) positively influence economic sophistication. These results align with previous studies (Kamguia et al., 2023; Li et al., 2020).

Inflation and unemployment hurt economic complexity in MENA countries. MENA countries constitute a politically volatile region that has been directly touched by the 2003 Iraq war and the events of the Arab Spring in 2010; thus, these countries will be productive for inquiry. Furthermore, the MENA region's inflation rate is greater and more variable than the rest of the world's inflation rate. This could result in a return to a lack of financial resources, limited trade, and a high level of poverty and unemployment. As a result, the worldwide price rise will have a significant impact on the inflation rate. The MENA region has frequently experienced high rates of youth unemployment. Young graduates may have trouble obtaining employment that fits their abilities, adding to their unusually high unemployment rates. The MENA region has been marked by labor migration movements, with migrant workers arriving from various countries to work in specific industries. This circumstance has the potential to reduce the diversity of abilities accessible in the labor market which inhibits export sophistication.

Table 7. Results with additional control (system GMM)

VARIABLES	(1)	(2)	(3)	(4)
L.ECI	0.228*** (0.082)	0.891*** (0.126)	0.220*** (0.025)	0.320*** (0.044)
FDI	9.576*** (2.785)	1.973* (1.178)	1.984* (1.151)	1.933*** (0.663)
TO	-0.473** (0.216)	-0.517*** (0.153)	-0.158 (0.196)	0.064 (0.097)
FO	0.456* (0.239)	0.071 (0.147)	1.646*** (0.283)	0.452*** (0.137)
HUM-TER	-0.269 (0.454)		1.129*** (0.202)	
HUM-PRI		0.299 (0.307)		0.117 (0.279)
Rit	0.099** (0.046)	0.182*** (0.032)	0.075** (0.037)	0.058*** (0.019)
POP	-0.132 (0.121)	-0.411*** (0.055)	-0.142*** (0.045)	-0.093* (0.048)
TEL	0.946*** (0.295)	0.188 (0.198)	0.589*** (0.212)	0.215 (0.263)
Aid	-5.107*** (1.409)	-3.939*** (0.684)	1.135** (0.482)	-2.524*** (0.644)
UNEM	-0.029** (0.013)			
ELC		0.012*** (0.003)		
INF				-0.015*** (0.005)
Fva			4.276*** (0.425)	
Constant	1.014 (1.240)	3.033*** (0.646)	-1.171*** (0.371)	0.200 (0.429)
Observations	324	284	287	283
Number of groups	18	18	18	18
ar2p	0.170	0.106	0.975	0.116
Hansen Test	0.1378	0.139	0.103	0.142
Number of instruments	**14**	15	16	16

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

5.2. Export diversification

The results of this estimation, which includes additional variables and measures of diversification, are shown in Table 8. Based on this table, we can say that the main results stay the same even after adding more control variables.

We show that electricity and participation in GVC have a positive effect on economic diversification. This result is consistent with the related literature (Odeh et Watts. 2019; Hang et

Pack, 2021). Inflation and unemployment hurt economic diversification in MENA countries. A high unemployment rate might lead to a decrease in domestic demand. With reduced discretionary income among consumers, demand for products and services, especially exportable goods, may fall. This may deter enterprises from investing in new industries and diversifying their production to meet prospective international demand. Inflation can raise production costs, including those for labor, raw materials, and energy. Higher manufacturing costs might make locally produced goods and services less competitive in foreign markets, making diversification into exporting areas more challenging.

Table 8. Results with additional control (system GMM)

VARIABLES	(1)	(2)	(3)	(4)
L.IC	0.342*** (0.093)	0.332** (0.138)	0.442*** (0.135)	-0.325 (0.232)
FDI	6.318*** (1.474)	4.001*** (0.555)	4.230*** (0.566)	1.766*** (2.637)
TO	-0.578* (0.325)	-0.590** (0.233)	-1.021** (0.398)	-2.903*** (0.959)
FO	0.585*** (0.105)	0.331** (0.136)	0.562*** (0.107)	1.067*** (0.216)
HUM-TER	-1.251*** (0.150)	-0.821*** (0.190)	-0.671*** (0.209)	0.673 (0.477)
DIS	0.030 (0.025)	-0.030 (0.022)	-0.004 (0.033)	-0.031 (0.049)
POP	0.037 (0.098)	0.139 (0.103)	0.151 (0.140)	-0.432** (0.219)
TEL	1.611*** (0.211)	0.792*** (0.158)	0.825*** (0.202)	0.966** (0.487)
ODA	-0.406 (0.571)	-1.973 (1.581)	-0.820* (0.482)	2.675** (1.241)
UNEM	0.025*** (0.004)			
ELC		-0.004*** (0.001)		
INF			0.006*** (0.002)	
FVA				-3.635*** (0.934)
Constant	0.417 (0.863)	-1.065 (0.831)	-0.876 (1.336)	-3.652* (2.049)
Observations	196	196	196	182
Number of groups	18	18	18	18
ar2p	0.839	0.863	0.735	0.0808
Hansen Test	0.214	0.102	0.159	0.496
Number of instruments	17	16	14	17

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Conclusion

This paper has attempted to measure the long-run determinants of export sophistication and diversification for 20 countries in the MENA region during 2000–2017.

The findings underpin the importance of FDI, financial openness, human capital, infrastructure, and institutional quality as key long-run determinants of export sophistication on the continent. Human capital is not a strong determinant of export sophistication. Also, our findings underpin the importance of trade openness, ODA, human capital, population, and infrastructure in export diversification.

Econometric results require several recommendations for developing countries' productive capacity in the MENA region, including improving the reallocation of resources to the most productive sectors and enhancing productivity and competitiveness. Good institutions and policies promote structural changes in production and exports. African countries require industrial policies that facilitate both diversification and sophistication. Human capital investment is a critical aspect of improving productive knowledge. Also, governments in both country sub-groups should not rely on natural resource rent exploitation in the process of economic complexity development. To improve institutions, countries in the MENA region must respect the rule of law and human rights, promote property rights, reduce corruption, support press freedom, and strengthen legal systems. These results clarify that while governance enables sophisticated exports, more trade diversification is needed. Another important conclusion is the relevance of policies aimed at diminishing infrastructural deficits and increasing human capital. Policymakers need to improve infrastructural policies that decrease the cost of doing business and promote foreign investments.

This study is subject to some limitations. Better estimates arise using repeated cross-sectional data for a longer period or panel household data. We can also use other alternative measures of export sophistication, like economic fitness, which measures a country's diversification and ability to produce complex goods on a globally competitive basis, or export sophistication (defined as the average income associated with a country's total exports). Due to limited data availability, our analysis cannot incorporate innovation and tax burden. Future research could improve the analysis with better data and alternative models and estimators. For instance, the effects of the actual weather variables. Despite the limitations, this study adds value to the literature by presenting findings on the determinants of structural transformation.

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