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Research Article

Trade Openness and Manufacturing in Africa: Case of North Africa

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Abstract: The renewed optimism brought about by the recent African Continental Free Trade Area (AfCFTA) is not without raising some concerns for the manufacturing sector in particular. Will more trade flows hurt or boost the manufacturing sector? This study attempts to provide some empirical answers to this question in the long-run by focusing on four North African Countries (NACs), namely, Algeria, Egypt, Morocco, and Tunisia. A dataset ranging from 1980 to 2018 is utilized within a vector auto-regression (VAR) framework. Findings indicate that trade openness props up the development of the manufacturing industry.

Keywords: Trade openness, manufacturing, North Africa, vector auto regression.

INTRODUCTION

The inception of the African Continental Free Trade Area (AfCFTA) in 2018 has generated a great deal of optimism among scholars and decision-makers across the entire African continent and beyond. Many experts have argued that this free trade area is long overdue and constitutes the most instrumental mechanism that can help boost the dismal level of intra-African trade. This has prompted some scholars to investigate the long-term economic effects of the AfCFTA in African countries. In such studies, the general challenge always remains the idiosyncrasies characterizing the continent's 54 countries. Indeed, these countries can broadly be parted in two groups with distinct social, political and economic dissimilarities. On the one hand, there are 46 countries in Sub-Saharan Africa, as compared to eight, on the other hand, in North Africa. The only common denominator of these countries remains the African continent. Therefore, applying outcomes of economic studies of one group to the other may be nothing short of a long stretch, or risky extrapolation, as they may vary widely and may not be applicable beyond that particular subset of countries.

North African countries (NACs) exhibit much closer ties and similarities to Middle Eastern countries on two notable accounts, namely, historically and culturally. With respect to the former, the experience of these countries during the colonial era was different from the one of nations in the Sub-Saharan region of the continent. As far as the latter is concerned, NACs are overwhelmingly Muslim and this fact has shaped their culture in a manner comparable to Middle Eastern countries'.

From a socio-economic global viewpoint, a wide range of statistics illustrates this attribute from education, health care and GDP per capita to the quality level of infrastructure, the breadth and depth of the financial system, and the extent of industrialization between the two zones. Simply put, there is a striking pattern of structural differences between these two groups. To avoid such a pitfall and provide the most accurate analysis and policy recommendations, this investigation explores the impacts of trade openness on industrialization with a focus on North Africa. This is the basis of the relevance of the present study. More precisely, it attempts to isolate the effects of trade openness on the manufacturing sector in North African countries. In other words, does trade openness undermine the expansion of the manufacturing sector in North Africa?.

Five sections are considered in this study. Section 2 presents the relevant literature, whereas the methodology and data are discussed in section 3. Section 4 breaks down the results and puts forward some policy recommendations and section 5 concludes the research work.

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LITERATURE REVIEW

The relationship between the manufacturing industry and trade openness on the continent has naturally drawn interests in the literature from many African scholars. Among others, Onakoya *et al*., (2012) establish, using an error correction model (ECM), that trade openness stimulates the manufacturing sector in Nigeria. Moreover, they find out that trade liberalization generates economy-wide benefits. As a result, they exhort decision-makers to pursue trade liberalization policies. In the same stream of ideas, Umoh and Effiong (2013) consider a sector-specific analysis to shed light on the link between trade openness and the performance of the manufacturing sector in Nigeria using an autoregressive distributed lag approach to cointegration. According to their study, trade openness enhances productivity of the Nigerian manufacturing sector both in the short- and long-run.

This topic has received consideration as well from scholars outside Africa. As an example, Govindaraju and Appukutty (2009) focus on Malaysia as they explore the connection between trade openness and manufacturing growth along with the associated direction of causality. Their results indicate that trade openness enhances growth in the Malaysian manufacturing sector in the long-run. The implication of such finding in their view is that policies should be oriented towards promoting trade openness.

North Africa presents an attractive environment compared to the bulk of sub-Sahara Africa for the development of manufacturing for a variety of reasons. Among these reasons, three main ones are notable: (i) a more adequate infrastructure network; (ii) a higher income per capita with rising and higher disposable income; and (iii) a relatively more skilled labor force. This situation has made North Africa the best candidate in becoming a hub for car manufacturing in Africa as evidenced by Bardhan (2015) and Westbrook (2018). Moreover, it provides North Africa more leverage in taking advantage of free trade areas through its manufacturing sector.

Dennis (2006), using the Global Trade Analysis Project (GTAP) model and database, scrutinizes the effects of regional free trade agreements and trade facilitation improvements upon development prospects of Middle East and North Africa (MENA) countries. According to the study, intra-regional integration and integration with the European Union further welfare across the region. In addition, these impacts are found to be at least three times more important in magnitude when trade facilitation is improved.

There is evidence in the literature that the benefits of trade openness for a country reach beyond the manufacturing sector into the entire economy. Indeed, Siyakiya (2017) shows that increased trade openness reinforces output growth in developing countries.

METHODOLOGY AND DATA

A succinct discussion of the methodology in this study is outlined in three steps. First, the main tool used is the ubiquitous vector auto-regression (VAR) as developed by Sims (1980)[1]. It is applied to a baseline model that comprises seven key variables accounting for the size of the manufacturing sector, the overall breadth of the economy, investment, government consumption, trade openness, the price level, and foreign exchange volatility. It is formally written as follows for a VAR of order q:

$$\mathbf{A_t = \Phi_1 A_{t-1} + \Phi_2 A_{t-2} + \Phi_3 A_{t-3} \ldots + \Phi_q A_{t-q} + \psi_t} \quad \mathbf{(1)}$$

Where A is a 7x1 vector of variables, Φ is a 7x7 vector of coefficients, and ψ is a 7x1 vector of disturbances.

Each variable is vetted in the second step to assess their order of integration. The presence of unit roots is tested using two main types of procedure to look for individual and common unit roots. At last, the Johansen (1987) test of cointegration is considered to search for any evidence of a long-run relationship between the variables.

The dataset in the study is derived from the World Bank Group's *World Development Indicators (WDI)*, and the *United Nations Conference on Trade and Development Statistics* (*UNCTADStat*). Due to data availability, four countries – Algeria, Egypt, Morocco, Tunisia – are selected over a 29-year period, from 1980 to 2018. In practice, the variables considered are manufacturing as a share of output (MANPGDP), real gross domestic product (RGDP), gross fixed capital formation as a percentage of output (GFCFPGDP), government consumption (GOVCS), trade openness (TROP), consumer price index (CPI), and foreign exchange volatility index (FXVI).

[1] A vast body of literature exists regarding VARs. For further details, see, among others, Watson (1994), Charemza and Deadman (1997), Brüggemann and Lütkepohl (2006), and Qin (2011).

RESULTS AND POLICY RECOMMENDATION

Summary statistics are important elements that provide a broad glimpse of variables considered in a study. With a balanced pool of data, common and individual samples yield the same statistics for each of the seven economic variables used. Five statistics are reported in Table 1, namely, mean, median, maximum, minimum, and standard deviation.

Table 1 – Summary statistics

	MANVAPGDP	RGDP	GFCFPGDP	GOVCS	TROP	CPI	FXVI
Mean	21.3434	8.99E+10	25.907	1.40E+10	64.8657	74.274	142.07
Median	16.9182	7.99E+09	25.3023	1.23E+10	60.8341	76.6511	143.17
Maximum	50.6373	2.86E+11	43.0485	3.42E+10	114.3548	231.1053	193.13
Minimum	11.1169	1.29E+10	12.4456	1.61E+09	30.2465	4.0185	100.08
Std. Dev.	9.3637	6.25E+10	5.7441	8.32E+09	18.74	43.8031	18.95
Observations	156	156	156	156	156	156	1014

The stationarity of variables is checked from the outset. Table 2 includes all results for unit root tests. A two-pronged testing approach allows for a more comprehensive tool to detect unit roots when dealing with a pooled dataset: (i) common unit root tests, and (ii) individual unit root tests. Levin, Lin and Chu (2002), and Breitung (2000) statistics are considered in the former case. As far as the latter is concerned, Im et al. (2003), and Fisher-type tests using Maddala and Wu (1999) and Choi (2001) statistics are applied[2].

Table 2 – Unit root tests (Level)

	Common roots		
		Statistic	p-value
Test 1	Levin, Lin & Chu (t-test)	-1.4162	0.0784
Test 2	Breitung (t-stat)	-4.7257	0.00
	Individual roots		
		Statistic	p-value
Test 3	Im, Pesaran, and Shin (W-stat)	-4.1189	0.00
Test 4	ADF-Fisher (Chi-Square)	43.2575	0.00
	ADF- Choi (Z-stat)	-4.0887	0.00

Both common and individual unit root tests indicate that data do not carry a unit root in levels. Estimations are accordingly performed using I(0) variables.

Cointegration tests reveal one cointegrating vector (See Table 3). Cointegration results are compiled in Table 4. In the four specifications considered, RGDP exhibits the expected positive sign with significance at the 1 percent level in two specifications. In essence, it is found out that a rise in real output boosts the share of manufacturing in the economy. Precisely, every percentage increase in real output expands manufacturing's share of GDP by an average of about 0.53 percentage points in the most optimistic case down to a low of 0.43 percentage points. Consistent positive signs similarly appear in all specifications for the impacts of GFCFPGDP on manufacturing, with two specifications showing significance at the 10 and 5 percent significance levels. The average yearly increase in manufacturing's share as a percentage of GDP hovered between 1.04 and 1.53 percentage points for every percentage point rise in GFCFPGDP. This finding corroborates economic theory. Indeed, an increase of investment in fixed capital fosters productive activities, including manufacturing, which usually relies a great deal on roads, bridges, facilities, among others, to produce and move goods. Also, government consumption positively affects the manufacturing sector in North African countries (NACs). This relationship is to be expected as more government purchases increase directly demand for goods in the economy and spur indirect consumption from the private sector. The investigation reveals that when government consumption goes up by one percent, the manufacturing's share of GDP can on average rise as high as 0.30 percentage points and as low as 0.03 percentage points[3].

[2] Individual intercepts and trends are used in both sets of methods.
[3] The actual figure is 0.027 percentage points.

Table 3 – Cointegration tests

	Number of cointegrating vectors	**Trace**	**p-value**	**Max Eigenvalue**	**p-value**
	0	205.7221	0.00	90.984	0.00
Linear Deterministic Trend	1	**114.7381**	**0.0759**	**44.4972**	**0.32**
	2	88.8038	0.2080	29.933	0.3306
Constant, with no	0	91.0543	0.04	38.7629	0.0374
Deterministic trend	1	**81.3612**	**0.2314**	**27.1247**	**0.1305**
	2	40.1123	0.256	19.8862	0.1572

Table 4 – Cointegration results (Dependent: MANPGDP)[4]

	I	**II**	**III**	**IV**
RGDP	10.8455	33.5129	52.7808***	43.1618***
GFCFPGDP	1.0435**	1.5338*	0.3049	1.427
GOVCS	2.6716*	42.5739	2.7199	30.3359**
TROP	0.2288	1.4906	1.3152***	2.4328***
CPI		48.5554***	29.1175***	
FXVI			0.3107***	0.3362***
C	404.4805	46.9661	201.3	235.806
N	155	155	155	155
Adj. R^2	0.2589	0.3042	0.5685	0.6904
F-Stat	9.5686	5.42	26.0361	125.003
p-value	0.0	0.0	0.0	0.0

The major outcome of this study hinges upon the estimate of trade openness. It uncovers that trade openness does not constitute an impediment to the manufacturing sector's expansion in NACs. All four specifications do signal a positive relationship between trade openness and manufacturing as a share of GDP. However, significance is evident in only two of them at the 1 percent level. The growth of manufacturing as a share of GDP is expected to average anywhere from 1.3 to 2.4 percentage points for every percentage point increase in trade openness. These impacts differ from the outcomes in Sub-Saharan African countries (SSACs), in particular, where they turn out negative[5]. This lends credence to the importance of this study that solely focuses on NACs as mentioned early on in the study. This difference essentially emanates from two major features that favor NACs. First, the infrastructures, hard and soft[6], of these countries are more expansive both qualitatively and quantitatively. It is well-known that improved infrastructure in a country enhances trade flows. Ismail and Mahyideen (2015) point out such positive relationships in five Asian countries[7]. The quality of infrastructure has also been identified in the literature as a fundamental that promotes trade performance (Nordas and Piermartini, 2004). Second, NACs enjoy a financial system that is in general more developed than their counterparts in SSACs.

The policy implications of these findings are two-fold. First, NACs have a notable basis that may be built upon to derive the most benefits out of the African Continental Free Trade Area (AfCFTA). They may consider expanding the manufacturing sector by promoting trade flows in and out of their respective countries. In that regard, investment to further improve both categories of infrastructure are in order to boost cross border flows of goods. Second decision-makers could contemplate, among other things, measures to prop up the access of manufacturing businesses to credit through domestic financial sectors at lower costs.

CONCLUSION

This study has examined the relationship between trade openness and the manufacturing sector in North African Countries (NACs). More specifically, it's revealed that increased trade openness does not impede, but rather fosters, the development of the manufacturing industry. This finding alleviates concerns about the recent continent-wide free trade area ratified by most African countries. Considering that the manufacturing sector is slated for an expansion with more

[4] RGDP, GOVCS and CPI are entered in logarithmic forms. Besides, *, **, *** denote statistical significance at the 10, 5, and 1 percent levels, respectively.

[5] Based upon empirical results of a comparable analysis conducted by the same author for Sub-Saharan African countries. (Forthcoming in the literature.)

[6] Hard infrastructure refers to road networks, airports, seaports, railways etc…, whereas soft infrastructure usually pertains to information and communication technology (ICT)-related installations, for instance, phone lines, servers, mobile devices, and other 3G, 4G or 5G telecommunication instruments.

[7] Thailand, Vietnam, India, China, and the Republic of Korea.

trade flows, a worthwhile empirical investigation could add to the present study by taking a closer look at the different sectors in the manufacturing industry to identify the main engines of this expansion.

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