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THE THREE-WAY LINKAGES BETWEEN EXPORT, IMPORT AND ECONOMIC GROWTH: NEW EVIDENCE FROM TUNISIA

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Abstract: *This study investigates the nexus between exports, imports and economic growth in Tunisia using annual time series data for the period 1965 - 2016 by implementing cointegration analysis and vector error correction model. The empirical results show that in the long run (i) exports affect negatively on economic growth, (ii) imports have positive effect on economic growth, (iii) economic growth have positive effect on exports, and imports have positive effect on exports. However in the short run empirical results show that there is (i) bi-directional causal relationship between exports and economic growth, (ii) uni-directional causal relationship from exports to imports, (iii) uni-directional causal relationship from imports to economic growth. These results provide evidence that imports and exports are necessary in Tunisia's economy and are presented as an engine of growth since they cause economic growth in the short term. But exports are not carried out and treated with a solid and fair manner according to their negative effect on economic growth in the long run, which offer new insights into Tunisia's openness policy for promoting economic growth.*

JEL classification: F10, F13, F14.

Keywords: Exports, Imports, Economic growth, Openness Policy, Tunisia.

I. INTRODUCTION

The theoretical literature on growth and international trade shows that trade catalyses long-term growth. Thus, trade, as a key and key component of the development path, has made civilization an increasingly important contribution to economic growth in most countries. International trade is seen as one of the catalysts and impulses to boost productivity and growth and, therefore, its contribution is dependent on its weight in economic activity. A fundamental discovery of the exhaustive literature shows that internationally active countries have the tendency and the ability to be more productive than countries that produce only for the domestic market. In addition, international trade supports the efficient allocation of resources and can lead to higher growth that can be converted into a greater accumulation of factors, particularly for economies associated with technology diffusion and spillovers knowledge. The link between international trade and economic growth has been an important area of study in recent years, specifically for developing countries. Several macroeconomic policies have been identified as having a significant impact on long-term economic growth. These include fiscal policy, monetary policy, the policy of liberalization of foreign trade, and policies to promote foreign direct investment (Khan and Villanueva (1991)). In the particular case of the policy of trade openness, the literature indicates the existence of a possible causality between the growths of international trade of economic growth. However, the many empirical studies that have examined the relationship between international trade and economic growth have not resolved the causality between these two variables (Fosu, 1999). The economic policy of liberalization of foreign trade generally aims to promote the expansion and diversification of exports and imports. The positive impact of such a policy of trade openness on growth stems from direct and indirect effects. In terms of direct effects, Goldstein and Khan (1982) show that production and demand are two main channels through which exports lead to growth and development. Indeed, there may be an increase in production following that of exports inasmuch as the development of exports makes it possible, on the one hand, to concentrate investment in this sector, where it is shown a comparative advantage and on the other hand an extension Infrastructure and transport and communication systems that in turn facilitate the production of other goods and services. Moreover, the production process would be improved by increasing international trade, since the international trade sector is a channel for the transmission of technology transfer,

knowledge and human capital, and economies of scale (Bardhan and Lewis, Chen, 1979, Khang, 1987, Feder, 1983, Grossman and Helpman, 1989, Edwards, 1992, Fosu, 2002). In addition to the positive impact of the volume of international trade for economic growth, it was also noted that the composition of trade has effects on growth as work has shown that the impact of trade of manufactures on growth is higher than that of raw materials (Fosu, 1990b, 1996b, Fosu, 2002). To achieve this, Wood and Mayer (2001) show that Africa's share of Africa's manufacturing trade could grow by improving infrastructure and policies. The effect of the increase in the value of trade for economic growth through demand is the result of the fact that this increase induces that of income and hence of demand for goods and services, including non-tradable goods. Indirect effects through which trade growth positively affects economic growth can be seen through global saving, foreign direct investment, and imports of capital goods and commodities (Goldstein and Khan, 1982). Indeed, rising global savings as a result of the increase in the marginal propensity to save from the trade sector will make it possible to finance domestic investment as will allow foreign direct investment and foreign borrowing. Similarly, foreign exchange earnings generated by exports will finance imports of capital goods and raw materials essential to domestic production (Fosu, 2002). On the other hand, by referring to the new theories of endogenous growth, it has been shown that trade liberalization produces an ambiguous effect on economic growth given the effects of other factors such as economies of scale, human capital, technical progress, returns to scale, education, health and public spending (Rodrik, 2000, Edwards 1992, Romer 1986, Lucas 1988, Becker et al. 1990, Otani and Villanueva, 1989, Grossman and Helpman, 1991). Some authors suggest that economic growth may be sustained in a context of trade liberalization if the country conducts adequate institutional reforms (Sheahan, 1994, Stein 1994, Rodrik 2001). These reforms, which Ghura and Hadjimichael (1996) believe are essential for generating economic incentives and improving the allocation of resources, are essentially the responsibility of the State, which must therefore ensure the quality of public institutions and the absence of which can constitute a risk which is detrimental to growth (Mosley, 1993; Acemogu et al., 2000; Easterly and Levine, 1996; Collier, 1995). Finally, the expansion of trade can also lead to economic growth through Verdoorn's law[1], which states that the change

[1] The Verdoorn's Law describes a simple long-run relation between productivity and output growth, whose coefficients were empirically estimated in 1949 by the Dutch economist Petrus Johannes

in productivity resulting from a specialization in the production of goods due to the increase in exports, skills and competencies in the sector, and reallocation of resources from less performing sectors to more efficient sectors, would lead to an increase in the product Verdoorn (1993). Among the studies that have shown that an expansion of trade has a significant positive impact on economic growth are Michaely, (1977); Balassa, (1978, 1989 and 1995); Tyler, (1981); Grossman and Helpman, (1989); Fosu, (1990a); Tybout, (1991 and 1992); Rahman (1993); Savvides, (1995); Asmah, (1998); Sachs and Warner, (1997); Edward, (1998); Frankel and Romer, (1999); Ram, (1987). On the other hand, others have concluded that the positive relationship between international trade and economic growth does not exist during certain periods for certain countries (Tyler (1981), Helleiner (1986), Ahmad and Kwan (1991), Suffie (1992), Onafowora and Owoye, (1998). For authors such as Kaldor (1964), Lancaster (1980), Krugman (1984), Stavrinos (1987), it is economic growth that creates a favorable environment for trade expansion in a country and not vice versa. For the latter, economic growth leads to an improvement in talent, skills and techniques which contribute to the expansion of international trade. Similarly, Michaely (1977) and Helleiner (1986) argue that a minimum level of development is needed before the benefits of expanding trade are observed. Thus, if development is defined as sustained economic growth over a long period of time and accompanied by a successful transformation of structures, then it would seem that economic growth is the driving force behind the expansion of international trade. Among the studies that support the idea of an expansion of trade induced by economic growth are Ghartey (1993); Oxley (1992); Kunst and Martin (1989). The hypothesis of international trade learning is also supported. However, the argument here is that, contrary to Verdoorn's law, trade-oriented firms do not become more productive and therefore influence economic growth, but rather performing firms that trade (Aw et al., 1997), Bernard and Jensen, 1997 cited by Krishna et al., 1998, Clerides et al., 1998). Some researchers, including Helpman and Krugman (1985), Bhagwati (1988), Grossman and Helpman (1991), have argued that the expansion of international trade resulting from the productivity gains and economies of scale will lead to a reduction of production costs and consequently result in a substantial improvement in productivity. This improvement in productivity will in turn leads to an increase in international trade and so on. Thus, the expansion of trade leads to economic

Verdoorn (1949).

growth, and economic growth leads to an expansion of trade. However, many of these studies have focused on groups of countries, accepting that these countries have common economic characteristics and behaviors or reactions. In reality, African and developing countries have their specificities in many respects, including economic, institutional and political. It is clear that no matter how different political systems differ from the economic disparities of countries; these countries cannot live in isolation from each other. They cannot produce sufficient capacity for their needs and products, so they resort to imports to cover their shortages and they cannot act. In the surplus that it has only through the export process and here shows the great importance of foreign trade without which the development process is difficult and therefore cannot raise the standard of living of individuals and therefore States to establish trade relations with other countries through the process of export and import. It can be said that foreign trade is of different importance from one country to another is the highest in the industrialized countries are very developed and technology that almost dominates the world commercially, and there are countries that view foreign trade as a matter of survival or the courtyard, while there are other countries less The importance of foreign trade in their national economies Foreign trade is of great importance in the national economy because it is a means to bring in hard currency and improve the balance of payments situation and thus strengthen the national economy and promote it, and allow for competition, leading to higher national income. Since the end of the Second World War, economic growth has been one of the most fundamental political and social problems in the world. This is due to the independence of most of the colonial areas at the beginning of this period. Immediately after liberation, the latter wanted to raise their standard of living by making many modifications to revive their economic growth. The majority of developing countries in this period, especially in the 1960s and 1970s, focused on the development of the domestic market with austerity trade policy, in which replacement of imports was a means of promoting economic development and reducing economic dependence through diversification However, this trend changed in the early 1980s because of the ineffectiveness of this policy, which did not have the expected impact on both its economic growth and its international integration. Thus, the trend towards linking economic growth to openness has changed, according to traditional arguments that allow for the benefits of excellence and the development of sectors with economies of scale and specialization in fields with significant global growth. In addition,

there are other arguments that export development allows for external pressure to be reduced and allows the import of non-productive capital internally, Which leads to the strengthening of the But this issue remains the focus of discussion. The divergence of views is whether the promotion of openness works in favor of developing countries so as to raise their economic growth; especially in the last two decades where there has been a radical change in thinking and transactions. At the beginning of the debt crisis and the development of financial crises in the 1980s, The liberalization of institutions from the intervention of the state, and leaving room for the forces of the global market; the purpose of which is to end the total unrest and reduce the level of indebtedness, while promoting growth and reduction of poverty; and because of the fear of these countries of economic openness, it is necessary to limit the direct relationship between economic growth and openness In order to know the effects of the latter on both economic growth and enter these countries. Tunisia has played an important role in ancient history since the time of the Phoenicians, Tamazight, Carthaginians, Vandals and Romans, because of its unique geographic location and the abundance of natural resources and its unique natural climate. Its openness to the Mediterranean and the East has contributed significantly to the creation of an important vogue in many sectors such as agriculture and trade, such as tourism, industry, trade and agriculture. Thanks to all these conditions and characteristics, if Tunisia is to be a robust and developed country, then exports and imports must be adopted, organized and effective in order to stimulate economic growth. For this reason, and within this broad research theme, we will re-invest the relationship between exports, imports and economic growth in the context of Tunisia. The second section focuses on a review of the literature on the link between exports, imports and economic growth. The empirical methodology and the results of the econometric estimates are given in paragraphs three and four, respectively. The last paragraph contains the conclusion of the paper with an emphasis on economic policy recommendations.

II. LITERATURE REVIEW

A gigantic literature is rational and wise on the turning of exports and imports in boosting economic growth. In recent decades, intensive empirical research has been charged with a careful observation of the relationship between exports, imports and economic growth. These

studies used time series or cross-sectional data with divergent results and divided into four groups. The first group includes studies by Chenery and Strout (1966); Michaely (1977); Balassa (1978); Heller and Porter; (1978); Tyler (1891); Kormendi and Mequire (1985) analyzed the link between economic growth and exports by applying a simple correlation coefficient technique and distinguished that export growth and economic growth were fiercely and strongly correlated positively. The second group includes the studies of Voivades (1973); Feder (1983); Balassa (1985); Ram (1987); Sprout and Weaver (1993); And Ukpolo (1994) applied regression techniques to accomplish the copula between export growth and economic growth, given the neoclassical equation of growth accounting. They were able to find a favorable value for the coefficient of export variables. The third group of researchers includes Jung and Marshall (1985); Chow (1987); Kunst and Marin (1989); Sung-Shen et al. (1990); Bahmani-Oskooee et al. (1991); Ahmad and Kwan (1991); Serletis (1992); Khan and Saqib (1993); Dodaro (1993); Jin and Yu (1995); Holman and Graves (1995) carefully observed the causal link between export growth and economic growth using the Granger causality test. The studies concluded that there were signs of a causal relationship between exports and growth. Finally, the fourth group of economists such as Kugler (1991), Serletis (1992), Oxley (1993), Bahmani-Oskooee and Alse (1993), Dutt and Ghosh (1994, 1996), Ghatak et al. (1997), Rahman and Mustaga (1998) and Islam (1998), which examined the effect of exports on economic growth using the co-integration technique and error correction models.

Table 1: Summary of the existing empirical studies concerns the relationships between exports, imports and economic growth from 2013 to 2017.

No	Authors	Countries	Periods	Econometrics Techniques	Keys Findings
1	**Abdullahi et al (2013)**	50 African countries	1991 - 2011	OLS	X => GDP
					M # GDP
2	**Alavinasab (2013)**	Iran	1961 - 2010	OLS	X => GDP
				Cointegration Analysis	M => GDP (negative effect)
3	**Bhatt (2013)**	Vietnam	1990 - 2008	VAR	X <= GDP
				Granger Causality Tests	
4	**Edoumiekumo and Opukri (2013)**	Nigeria	1981 - 2008	Cointegration Analysis	X <= GDP
				Granger Causality Tests	M => GDP
					M => X
5	**Farooq et al (2013)**	Pakistan	1987 - 2009	ARDL	T <=> GDP: Long Run
				Granger Causality Tests	T # GDP: Short Run
6	**Gossel and Biekpe (2013)**	South Africa	1995 - 2011	VAR	X => GDP
				TYDL	M <=> GDP
					X => M

7	**Hye et al (2013)**	5 South Asian countries	1960 - 2009	ARDL	X => M (Bangladesh, Bhutan, Nepal, Sri Lanka)
				Granger Causality Tests	M <=> GDP (Bangladesh, India, Sri Lanka)
					X => GDP (Bangladesh, Nepal)
					X <=> GDP (Bhutan, India, Pakistan, Sri Lanka)
					X <=> M (Bhutan, India, Pakistan)
					X <= GDP (Pakistan)
8	**Ibraheem et al (2013)**	Nigeria	1975 - 2012	OLS	T => GDP
9	**Jawaid and Raza (2013)**	India	1980 - 2010	ARDL	T => GDP: Long Run
				Granger Causality Tests	T <=> GDP: Short Run
10	**Mehic et al (2013)**	7 Southeast European Countries	1998 - 2007	OLS	T => GDP
11	**Meraj (2013)**	Bangladesh	1971 - 2005	Cointegration Analysis	X <=> GDP
				VECM	M # GDP
				Granger Causality Tests	X # M
12	**Mehrara et al (2013)**	19 oil-rich Countries	1991 - 2006	OLS	T => GDP (negative effect)
13	**Rahman and Shahbaz (2013)**	Pakistan	1990 - 2011	ARDL	M <=> GDP: Long Run
				Cointegration Analysis	M <=> GDP: Short Run
				VECM	
				Granger Causality Tests	
14	**Saqib et al (2013)**	Pakistan	1981 - 2010	OLS	T => GDP (negative effect)
15	**Shahbaz et al (2013)**	China	1971 - 2011	ARDL	T => GDP: Long Run
				VECM	T <=> GDP: Short Run
16	**Shahbaz et al (2013)**	Indonesia	1975 -2011	ARDL	T <=> GDP: Long Run
				VECM	T # GDP: Short Run
				Granger Causality Tests	
17	**Sharma and Kaur (2013)**	India and China	1976 -2011	Granger Causality Tests	X <=> M
18	**Umer and Alam (2013)**	Pakistan	1960 - 2011	Cointegration Analysis	T => GDP: Long Run (negative effect)
				VECM	
19	**Velnampy and Achchuthan (2013)**	Sri Lanka	1970 - 2010	OLS	X => GDP
					M => GDP
20	**Zeren and Ari (2013)**	G7 countries	1970 - 2011	Granger Causality Tests	T <=> GDP
21	**Aboubacar (2014)**	Niger	1980 - 2013	Cointegration Analysis	T => GDP
				Granger Causality Tests	
22	**Ahmed et al (2014)**	Pakistan	1983 - 2013	Cointegration Analysis	X => GDP
				Granger Causality Tests	M => GDP
23	**Azeez et al (2014)**	Nigeria	2000 - 2012	OLS	X => GDP
					M => GDP
					T => GDP
24	**Belloumi (2014)**	Tunisia	1970 - 2008	ARDL	T # GDP: Short Run
				Granger Causality Tests	
25	**Ben Aïssa et al (2014)**	11 African countries	1980 - 2008	Cointegration Analysis	T <=> GDP: Long Run
				VECM	T # GDP: Short Run
				Granger Causality Tests	
26	**Cambazoglu and Karaalp (2014)**	Turkey	1980 - 2010	VAR	X => GDP
					M # GDP
27	**Chatterji et al (2014)**	India	1970 - 2010	VAR	X => GDP

				Granger Causality Tests	M => GDP
28	**Gossel and Biekpe (2014)**	South Africa	1995 - 2011	TYDL	M <=> GDP
					X => GDP
29	**Hussain (2014)**	Pakistan	1976 - 2011	Cointegration Analysis	T # GDP: Long Run
				VECM	X # M Long Run
				Granger Causality Tests	X <=> GDP: Short Run
30	**Kalumbu and Sheefeni (2014)**	Namibia	1980 - 2012	Cointegration Analysis	T <= GDP
				VAR	
				Granger Causality Tests	
31	**Kristjanpoller and Olson (2014)**	Latin American countries	1970 - 2010	Cointegration Analysis	X => GDP: Long Run
				VECM	M => GDP: Long Run (negative effect)
32	**Lau et al (2014)**	Malaysia	1970 - 2008	Cointegration Analysis	T <= GDP: Short Run
				VECM	T # GDP: Long Run
				Granger Causality Tests	
33	**Murthy et al (2014)**	India	1971 - 2012	Cointegration Analysis	T <= GDP: Long Run
				VECM	
				Granger Causality Tests	
34	**Nasreen and Anwar (2014)**	15 Asian Countries	1980 - 2011	Cointegration Analysis	T <=> GDP: Long Run
				Granger Causality Tests	
35	**Olubiyi (2014)**	Nigeria	1980 - 2012	Cointegration Analysis	X <= GDP: Short Run
				VECM	M <= GDP: Short Run
				Granger Causality Tests	
36	**Omri and Kahouli (2014)**	13 MENA countries	1990 - 2010	GMM	T => GDP
37	**Sebri and Ben-Salha (2014)**	BRICS countries	1971–2010	Cointegration Analysis	T => GDP
				VECM	
				Granger Causality Tests	
38	**Sikwila et al (2014)**	South Africa	1994 - 2013	OLS	T => GDP
39	**Turan and Karamanaj (2014)**	Albania	1984 - 2012	OLS	X => GDP
					M => GDP (negative effect)
40	**Zaheer et al (2014)**	Pakistan	2000 - 2010	Cointegration Analysis	X => GDP: Long Run
				VECM	M => GDP: Long Run (negative effect)
					X => GDP: Short Run
					X # M
41	**Adeleye et al (2015)**	Nigeria	1988 - 2012	OLS	X => GDP: Long Run
				Cointegration Analysis	M => GDP: Long Run (negative effect)
				ECM	X # M
42	**Alaoui (2015)**	Morocco	1980 - 2013	Cointegration Analysis	T => GDP: Long Run
				VECM	M <=> GDP: Short Run
				Granger Causality Tests	X => M Short Run
					X # GDP
43	**Andrews (2015)**	Liberia	1970 - 2011	Cointegration Analysis	M <=> GDP
				Granger Causality Tests	X => M
44	**Azid (2015)**	50 developing countries	1990-2009	Pooled Regression Models	T => GDP
				Fixed Effects Models	
45	**Fenira (2015)**	82 Developing Countries	1996 - 2012	OLS	T => GDP
46	**Gokmenoglu et al (2015)**	Pakistan	1967-2013	Cointegration Analysis	X # GDP
				Granger Causality Tests	GDP => M

					M => X
47	**Gokmenoglu et al (2015)**	10 South East European Countries	1996 - 2012	GMM	T => GDP
48	**Yusoff and Nuh (2015)**	Thailand	1970 - 2008	Cointegration Analysis	T <=> GDP: Long Run
				VECM	T <=> GDP: Short Run
				Cointegration Analysis	
49	**Hussaini et al (2015)**	India	1980 - 2013	Cointegration Analysis	X <=> GDP
				VECM	M <=> GDP
				Granger Causality Tests	X => M
50	**Hye and Lau (2015)**	India	1971 - 2009	ARDL	T => GDP: Long Run (negative effect)
					T <= GDP: Short Run
51	**Kurihara (2015)**	Japan	1990 - 2014	OLS	T # GDP
				VAR	
52	**Mohsen and Chua (2015)**	Syria	1980 - 2010	Cointegration Analysis	T => GDP: Long Run
				VECM	T <=> GDP: Short Run
				Granger Causality Tests	
53	**Musila and Yiheyis (2015)**	Kenya	1982 - 2009	OLS	T => GDP (negative effect)
54	**Omri et al (2015)**	12 MENA countries	1990 - 2011	GMM	T <=> GDP
55	**Rai and Jhala (2015)**	India	2000 - 2013	Cointegration Analysis	X <=> GDP
				Granger Causality Tests	M <=> GDP
				OLS	M => X
56	**Sakyi et al (2015)**	Ghana	1970 - 2011	ARDL	T => GDP: Long Run
57	**Solarin and Shahbaz (2015)**	Malaysia	1971 - 2012	ARDL	T => GDP
				VECM	
				Granger Causality Tests	
58	**Tahir et al (2015)**	Pakistan	1977 - 2013	Cointegration Analysis	X => GDP: Long Run and Short Run (negative effect)
				ARDL	
				ECM	
59	**Ulaşan (2015)**	130 Countries	1960 - 2000	GMM	T # GDP
60	**Umer and Alam (2015)**	Pakistan	1960 - 2011	Cointegration Analysis	T <=> GDP: Long Run
				VECM	T # GDP: Short Run
				VAR	
				Granger Causality Tests	
61	**Adams et al (2016)**	16 sub-Saharan African (SSA) countries	1971 - 2013	PVAR	T # GDP
				GMM	
62	**Albiman and Suleiman (2016)**	Malaysia	1967-2010	Cointegration Analysis	X => M
				VAR	
				Granger Causality Tests	
63	**Bal et al (2016)**	India	1970 - 2012	ARDL	T => GDP: Long Run
				ECM	
64	**Dritsakis and Stamatiou (2016)**	European Union members	1995 - 2013	Cointegration Analysis	T <=> GDP: Long Run
				VECM	T => GDP: Short Run
				Granger Causality Tests	
65	**Hamdan (2016)**	17 Arab countries	1995 - 2013	Poold Regression Model	X => GDP
				Fixed Effect Model	M => GDP
				Random effect Model	
				Hausman Test	
66	**Hussain and Haque (2016)**	Bangladesh	1973 - 2014	Cointegration Analysis	T => GDP

				VECM	
67	**John (2016)**	5 Brics Countries	1990 - 2014	GMM	T => GDP
68	**Judith and Chijindu (2016)**	Nigeria	1987 - 2014	Cointegration Analysis	T => GDP: Long Run
				ECM	T # GDP: Short Run
				Granger Causality Tests	
69	**Leitão and Shahbaz (2016)**	27 European Union Countries	1999 - 2009	OLS	T => GDP
				Fixed Effect Model	
				Random effect Model	
70	**Mohapatra et al (2016)**	India	1970 - 2014	Cointegration Analysis	T => GDP: Long Run
				VECM	T => GDP: Short Run
				Granger Causality Tests	
71	**Okafor and Shaibu (2016)**	Nigeria	1986 - 2013	ARDL	T => GDP: Long Run
					T => GDP: Short Run
72	**Pilinkiene (2016)**	Central and Eastern European countries (CEEs)	2000 - 2014	Correlation Analysis	T <=> GDP
				VAR	
				Granger Causality Tests	
73	**Rahman and Mamun (2016)**	Australia	1960 - 2012	Cointegration Analysis	T # GDP: Long Run
				ARDL	T <=> GDP: Short Run
				VAR	
				Granger Causality Tests	
74	**Riyath and Jahfer (2016)**	Sri Lanka	1962 - 2015	Cointegration Analysis	X => GDP: Long Run
				VECM	M => GDP: Long Run
				Granger Causality Tests	X => GDP: Short Run
					M # GDP: Short Run
					M # X Long Run and Short Run
75	**Shahbaz et al (2016)**	BRICS Countries	1991 - 2015	Cointegration Analysis	T => GDP: Long Run
				VECM	T <=> GDP: Short Run
				Granger Causality Tests	
				Fixed Effect Model	
76	**Silberberger and Königer (2016)**	All Developing Countries	1985 - 2009	Poold Regression Model	T => GDP
				Fixed Effect Model	
				GMM	
77	**Sy et al (2016)**	40 European Countries	1985 - 2014	OLS	T <=> GDP
78	**XU (2016)**	China	1978 - 2008	GMM	T => GDP
79	**Tan and Tang (2016)**	ASEAN-5 regions	1970 - 2012	Cointegration Analysis	T <=> GDP: Long Run (Philippines and Thailand)
				Granger Causality Tests	T # GDP: Long Run (Indonesia and Malaysia)
					T => GDP: Long Run (Singapore)
					T <=> GDP: Short Run (Malaysia, Singapore and Philippines) T # GDP: Short Run (Indonesia)
					T => GDP: Short Run (Thailand)
80	**Yüksel and Zengin (2016)**	6 Developing Countries	1961 - 2014	Cointegration Analysis	X => M (Malaysia)
				VECM	X => GDP (Argentina)

				Granger Causality Tests	X # GDP (Brazil, China, Malaysia, Mexico and Turkey)
					M # GDP (Brazil, Argentina, China, Malaysia, Mexico and Turkey)
					M => X (China and Turkey)

81	**Akter and Bulbul (2017)**	8 Countries	2001 -2015	Cointegration Analysis	X <=> GDP: Short Run (Bangladesh)
				VAR	M <=> GDP: Short Run (Bangladesh)

				VECM	X => GDP: Long Run (Nigeria)
				Granger Causality Tests	M => GDP: Long Run (Nigeria)
					M <= GDP: Long Run (Turkey)
					M <= X: Long Run (Turkey)
					M <= GDP: Short Run (Turkey)
					M <= X: Short Run (Turkey)
					M => X: Short Run (Egypt and Indonesia)
					M => X: Long Run (Malaysia)
					X # GDP (Pakistan and Iran)
					M # GDP (Pakistan and Iran)
					X # M (Pakistan and Iran)
82	**Ayad and Belmokaddem (2017)**	16 MENA countries	1980 - 2014	Cointegration Analysis	Trade # GDP
				VAR	
				TYDL	
83	**Bakari (2017a)**	Japan	1970 - 2015	OLS	X => GDP
					M # GDP
84	**Bakari and Krit (2017)**	Mauritania	1960 - 2015	Cointegration Analysis	X => GDP: Long run
				VECM	M # GDP: Long run
				Granger Causality Tests	M <=> GDP: Short run
85	**Bakari and Mabrouki (2017)**	Panama	1980 - 2015	Cointegration Analysis	Trade => GDP
				VAR	
				Granger Causality Tests	
86	**Berasaluce and Romero (2017)**	Korea	1980 - 2016	Cointegration Analysis	M <=> GDP
				VECM	X # GDP
				Granger Causality Tests	
87	**Bongini et al (2017)**	(CESEE) countries	1995 - 2014	GMM	Trade # GDP
88	**Chaudhry et al (2017)**	Pakistan	1948 - 2013	Cointegration Analysis	X <=> M
				ARDL	
				VECM	
				Granger Causality Tests	
89	**Dutta et al (2017)**	Bangladesh	1976 - 2014	Granger Causality Tests	Trade <= GDP
90	**Faisal et al (2017)**	Saudi Arabia	1968 - 2014	ARDL	X => GDP
				Granger Causality Tests	M # GDP
91	**Iyke (2017)**	17 CEE countries	1994 – 2014	Correlation Analysis	Trade => GDP
				GMM	
92	**Keho (2017)**	Cote d'Ivoire	1965 - 2014	Cointegration Analysis	Trade => GDP: Long run
				ARDL	Trade => GDP: Short run
				Granger Causality Tests	
				FMOLS	
				DOLS	
93	**Kilic and Beser (2017)**	5 Countries	1992 - 2015	Granger Causality Tests	M <=> GDP
					X <= GDP
					M => GDP
94	**Nursini (2017)**	Indonesia	1990 - 2015	Cointegration Analysis	Trade => GDP
95	**Ofeh and Muandzevara (2017)**	Cameroon	1980 - 2013	Correlation Analysis	X => GDP (Positive effect)
				OLS	M => GDP (negative effect)
96	**Ofori-Abebrese et al (2017)**	Ghana	1970 - 2013	ARDL	Trade # GDP

				Granger Causality Tests	
97	**Pradhan et al (2017)**	G-20 Countries	1988 - 2013	VECM	Trade => GDP: Long run
				Granger Causality Tests	Trade <= > GDP: Short run
98	**Sakyi et al (2017)**	35 African countries	2010 - 2014	GMM	Trade => GDP
99	**Sichoongwe (2017)**	Zambia	1966-2014	OLS	Trade => GDP
100	**Zahonogo (2017)**	42 SSA countries	1980 - 2012	Cointegration Analysis	Trade => GDP: Long run
				Pooled Mean Group	M => GDP: Long Run
				GMM	X => GDP: Long Run

It is clear from these recent studies that surveys on the link between exports, imports and economic growth have focused on the VAR and VECM models and the co-integration approach to capture short-term dynamics and the long-term effects of these three variables, finding different and broad results.

III. DATA, METHODOLOGY AND MODEL

To determine the nexus between exports, imports and economic growth in Tunisia, we will use the neoclassical production function, whose economic growth will be expressed by gross domestic product at constant price, imports and exports will be expressed by their exact values at constant price. The sample covers the period 1965 - 2016 and all variables are selected for the 2016 World Bank report.

The augmented production function including exports and imports is expressed as:

$$\mathbf{GDP_t = f(Exports, Imports)} \quad \mathbf{(1)}$$

The function can also be represented in a log-linear econometric format thus:

$$\mathbf{\log(GDP)_t = \beta_0 + \beta_1 \log(Exports)_t + \beta_2 \log(Imports)_t + \varepsilon_t} \quad \mathbf{(2)}$$

Where:

- β_0 : The constant term.
- β_1: coefficient of variable (Exports)
- β_2: coefficient of variables (Imports)
- t: The time trend.

- ε: The random error term assumed to be normally, identically and independently distributed.

Otherwise, and concerning the cucumber of variables in our model {only two variables (exports and imports)}; It is renowned that there are sundry variables that can step inside in the production function by rising a leverage on economic growth, such as labor force, population, human capital, climate change, FDI, renewable energy, pollution, domestic investment and other factors of effectiveness. However, we employed those three variables to better expound and preferable apprehend the frontal linkage-way between, exports, imports and economic growth. On the other hand, the vestige of the other variables not contain as part of a whole in the function (1) is included in the function of our econometric model and predominately in the error term. Since we have known that the error term is recognized and remains always unknown by curbing the effects of the other factors in the shape of a residue {function (2)}. In addition, there are several researchers in this field who have used only the two variables export and import in the function of production to express their relations with economic growth such as Baharumshah and Rashid (1999); Din (2004); Awokuse (2008); Akbay (2011); Kubo (2011); Hamdi (2013); Velnampy and Achchuthan (2013); Hussain (2014); Turan and Karamanaj (2014); Mohsen (2015); Bakari (2016); Bakari and Mabrouki (2016); Yüksel and Zengin (2016); Bakari and Krit (2017); Bakari and Mabrouki (2017); Bakari and Saaidia (2017). This type of production function is very effective and very clear to justify the relationship between trade and economic growth, especially in the developing countries and essentially in the countries of Africa as the case of Tunisia, since these countries possess several Natural resources and rare goods such as oil, gas, phosphate, gold, copper, iron, phosphorus for export, and generally require high-level imports to extract these resources. In addition the share of investment and labor force are not of great influence simply because of the emergence of percentages of unemployment and very high poverty. Alternatively, another dialectics that prop the choice of these variable ones and only is that we have applied an econometric model that depicts economic growth and not an accounting identity since it is impossible in a large country and in the presence of large economic magnitudes, by eliminating the various risks that can appear by non-logical causal economically. Furthermore, in order to involve the estimation of our production function, we are compelled to carry out a set of steps to determine the choice of our econometric model

that will be chosen. "Beware of theoretical a priori. Let the data speak" (Sims, 1996). This sentence could, by itself, summarize the work for which Sims was rewarded. First, the time series properties of the data are examined using two units-root tests for the null hypothesis of non-stationarity: The augmented Dickey and Fuller (1979) (ADF) test and the Phillips and Perron (1987) (PP). If our variables are stationary and integrated in a specific order, we will imply the possibility of cointegrating relationships by applying the cointegration analysis using the Johanson test. Johansen (1991) modeled time series as a reduced rank regression in which they computed the maximum likelihood estimates in the multivariate error correction model (ECM) with Gaussian errors. Finally, and after each estimate of our chosen model, we always apply a set of tests to check the quality of our estimate and the robustness of our model using diagnostic tests.

IV. EMPIRICAL ANALYSIS

1) Tests for unit roots : ADF and PP

To determine the order of integration of each variable, the stationarity tests are applied. In analyzing and empirical work, there are several stationary tests to determine the order of integration of the variables. In our empirical investigation, we will apply two tests of stationery which are the ADF test and the PP test.

The general form of ADF test is estimated by the following regression:

$$\Delta Y_t = a + \beta Y_{t-1} + \sum_{i=0}^{n} \beta_i \Delta Y_i + \varepsilon_t \quad (3)$$

The general form of PP test is estimated by the following regression

$$\Delta y_t = \alpha + \beta \Delta y_{t-1} + \varepsilon_t \quad (4)$$

Where Δ is the first difference operator, Y is a time series, t is a linear time trend, α is a constant, n is the optimum number of lags in the dependent variable and ε is the random error term.

For these two tests, the rule states that in each variable the statistical tests of the ADF and PP tests are superior to the critical value in different level and the probability of this variable at the same time has a probability of less than 5%. In this case, we can say that this variable is stationary at this level and this order of integration.

Table 2: Tests for unit roots: ADF and PP

Variable	ADF		PP		Order of Integration
	Test Statistic	Probability	Test Statistic	Probability	
Log(GDP)	6.904913	0.0000	6.985056	0.0000	I(1)
Log(Exports)	7.571080	0.0000	7.559320	0.0000	I(1)
Log(Imports)	7.119584	0.0000	7.115935	0.0000	I(1)

The application of the stationary tests ADF and PP informs us that all the variables are stationary in first differences. In the realizations of all these variables, the statistical tests ADF and PP are superior to the critical values in the 3 thresholds 1%, 5% and 10%, possessing probabilities less than 5% in the order of integration 1. So we can say that the cointegration analysis will be retained.

2) Cointegration Analysis

The cointegration analysis is done and is applied in two steps. The first step consists in determining the number of lags existing in our model and the second step consists in checking the existence of the cointegrating relations between the variables studied using the cointegration tests

a- Determination of the number of lags

To select the number of lags in our estimate, one expects a set of information criteria as AIC, SC, HQ, LR and FPE. In our case, we will use the criterion SC since it is used several times in several empirical works. The criterion SC indicates that the number of delay existing in the sets of our variables used concerning our estimation is equal to 2. So we go on to the next step which assimilates to apply the cointegration test to determine the number of cointegration relation between the different variables.

b- Johanson Test

To blunt and to identify the subsistence of a cointegration relation, one generally applies a set of tests like Granger-Engel's algorithm (1987); the approaches of Johansen (1988, 1991); The

Stock - Watson test (1988); The Phillips-Ouliaris test (1990). In our analysis, we will use the Johanson test. The popular approach to estimate the cointegration is Johansen test given by Johansen (1988) and Johansen and Juselius (1990) which is a vector auto-regression (VAR) based test.

After determining the order of integration, two statistics named trace statistics ($\boldsymbol{\lambda}_{Trace}$) and maximum Eigenvalue ($\boldsymbol{\lambda}_{Max}$) are used to determine the number of cointegrating vectors. In trace statistics, the following VAR is estimated.

$$\Delta \boldsymbol{y_t} = \boldsymbol{r_1}\Delta \boldsymbol{y_{t-1}} + \boldsymbol{r_2}\Delta \boldsymbol{y_{t-2}} + \ \ldots\ldots\ldots\ldots \boldsymbol{r_P}\Delta \boldsymbol{y_{t-p+1}} \quad \textbf{(5)}$$

On the other hand, in maximum Eigenvalue, the following VAR is estimated:

$$\boldsymbol{y_t} = \boldsymbol{r_1}\Delta \boldsymbol{y_{t-1}} + \boldsymbol{r_2}\Delta \boldsymbol{y_{t-2}} + \ \ldots\ldots\ldots\ldots \boldsymbol{r_P}\Delta \boldsymbol{y_{t-p+1}} \quad \textbf{(6)}$$

Where y_t the vector of the variables involved in the model and p is is the order of auto-regression. In Johansen's cointegration test, the null hypothesis states there is no cointegrating vector ($r = 0$) and the alternate hypothesis makes an indication of one or more cointegrating vectors ($r > 1$).

The econometric rule of this test emphasizes that if the trace statistic is greater than the critical value and has a probability of less than 5%. In this case, we can affirm the existence of a cointegration relation.

Table 3: Johanson Test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.491036	59.70794	29.79707	0.0000
At most 1 *	0.436134	30.66670	15.49471	0.0001
At most 2 *	0.130851	6.030364	3.841466	0.0141
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.491036	29.04124	21.13162	0.0031
At most 1 *	0.436134	24.63634	14.26460	0.0008
At most 2 *	0.130851	6.030364	3.841466	0.0141
Max-Eigen value test indicates 3 cointegrating eqn(s) at the 0.05 level				

*** denotes rejection of the hypothesis at the 0.05 level**

****MacKinnon-Haug-Michelis (1999) p-values**

The results of the test of Johanson expose us the presence of the three cointegration relation between the 3 variables. Since the analysis of the cointegration announces the existence of a cointegration relation between the 3 variables, one can say that the model with error correction will be retained.

3) Estimation of Vector Error Correction Model

The target to perform an estimate based on the error correction model is to extract the effect of the explanatory variables on the variable to be explained in the short term and the long term.

As, GDP, exports and imports are cointegrated**,** VECMs (vector error correction model) representation would have the following form, in equations:

$$\textbf{Model 1: } \Delta GDP_t = \sum_{i-1}^{k} \alpha_0 \, \Delta GDP_{t-i} + \sum_{i-1}^{k} \alpha_1 \, \Delta Exports_{t-i} + \sum_{i=1}^{n} \alpha_2 \, \Delta Imports_{t-i} + Z_1 EC1_{t-1} + \varepsilon_{1t} \quad (7)$$

$$\textbf{Model 2: } \Delta Exports_t = \sum_{i-1}^{k} \alpha_0 \, \Delta GDP_{t-i} + \sum_{i-1}^{k} \alpha_1 \, \Delta Exports_{t-i} + \sum_{i=1}^{n} \alpha_2 \, \Delta Imports_{t-i} + Z_1 EC1_{t-1} + \varepsilon_{1t} \quad (8)$$

$$\textbf{Model 3: } \Delta Imports_t = \sum_{i-1}^{k} \alpha_0 \, \Delta GDP_{t-i} + \sum_{i-1}^{k} \alpha_1 \, \Delta Exports_{t-i} + \sum_{i=1}^{n} \alpha_2 \, \Delta Imports_{t-i} + Z_1 EC1_{t-1} + \varepsilon_{1t} \quad (9)$$

Where:

- Δ: The difference operator.
- k : The number of lags
- $\alpha_0, \alpha_1 and\ \alpha_2$: Short run coefficients to be estimated.
- $EC1_{t-1}$: The error correction term derived from the long-run co integration relationship.
- Z_1 : The error correction coefficients of $EC1_{t-1}$.
- ε_{1t}: The serially uncorrelated error terms in equation

Otherwise the VECMs estimate in our analysis gives us the following equations:

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$$D(DLOG(GDP)) = C(1) * (DLOG(GDP(-1)) + 2.31 * DLOG(EXPORT(-1)) - 2.71 * DLOG(IMPORT(-1)) - 0.06) + C(2) * D(DLOG(GDP(-1))) + C(3) * D(DLOG(GDP(-2))) + C(4) * D(DLOG(EXPORT(-1))) + C(5) * D(DLOG(EXPORT(-2))) + C(6) * D(DLOG(IMPORT(-1))) + C(7) * D(DLOG(IMPORT(-2))) + C(8)$$

$$D(DLOG(EXPORT)) = C(1) * (DLOG(EXPORT(-1)) - 0.36 * DLOG(GDP(-1)) - 0.19 * DLOG(IMPORTS(-1)) - 0.03) + C(2) * D(DLOG(EXPORT(-1))) + C(3) * D(DLOG(EXPORT(-2))) + C(4) * D(DLOG(GDP(-1))) + C(5) * D(DLOG(GDP(-2))) + C(6) * D(DLOG(IMPORTS(-1))) + C(7) * D(DLOG(IMPORTS(-2))) + C(8)$$

$$D(DLOG(IMPORTS)) = C(1) * (DLOG(IMPORTS(-1)) + 1.83 * DLOG(GDP(-1)) - 5.02 * DLOG(EXPORT(-1)) + 0.18) + C(2) * D(DLOG(IMPORTS(-1))) + C(3) * D(DLOG(IMPORTS(-2))) + C(4) * D(DLOG(GDP(-1))) + C(5) * D(DLOG(GDP(-2))) + C(6) * D(DLOG(EXPORT(-1))) + C(7) * D(DLOG(EXPORT(-2))) + C(8)$$

By using these equations, we will determine in the long term and in the short term the nexus between exports, imports and economic growth. For the existence of a short-term causal relation, the following hypothesis is applied: If there is a probability less than 5%, then the independent variable causes the dependent variable. On the other hand, if there is a probability greater than 5% in this case, the absence of a short-term causality relationship can be noted. In the long run, if the error correction term has a negative coefficient and a negative probability in this case it can be said that the equilibrium cointegration equation is significant and there is a long-term relationship between the variables.

Table 4: Granger Causality test results based on Vector Error-Correction Models (VECMs)

Independent Variables	GDP	Dependent variables		
		Export	Import	
GDP	-	0.0733	0.2334	**Short Run**
Exports	0.0028	-	0.0091	
Imports	0.0084	0.1104	-	
Lagged ECT	[-0.720098]*	[-1.195277]*	[-0.048934]	**Long Run**

4) Checking the Quality of Estimation

a- Diagnostics Tests

As usual at the end of each empirical investigation, we must apply a set of analysis to verify the robustness and credibility of our work, our model and the results of our estimation. To this we will try to apply a broad analysis to achieve this audit objective, including the use of heteroskedasticity tests, diagnostic tests and the stability of the VAR model

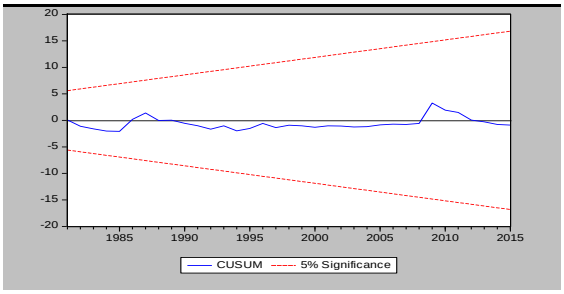
Table 5: VECMs Models Diagnostic

Diagnostics Tests	VECMs Models Diagnostic		
	GDP	Export	Import
R^2	0.569236	0.568278	0.387414
F-statistic	6.607285	7.521732	3.613843
Probability (F-statistic)	0.000053	0.000009	0.004148
Heteroskedasticity Test: Breusch-Pagan-Godfrey	0.0517	0.7304	0.9301
Heteroskedasticity Test: Harvey	0.5443	0.8539	0.6126
Heteroskedasticity Test: Glejser	0.1171	0.7966	0.9080
Heteroskedasticity Test: ARCH	0.9584	0.3754	0.2029
Breusch-Godfrey Serial Correlation LM Test:	0.6012	0.6731	0.9913
Jarque-Bera	0.0000	0.945170	0.164157

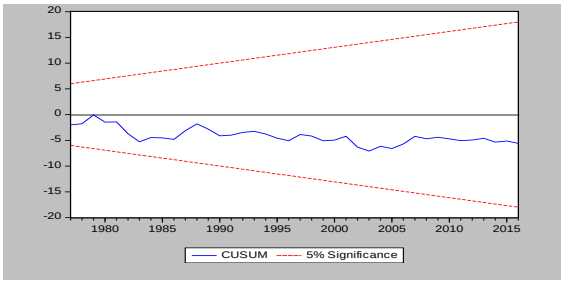
b- VAR Stability

Finally we will apply to use the test CUSUM of Squares, this test makes it possible to study the stability of the model estimated over time.

Model 1



Model 2



Model 3

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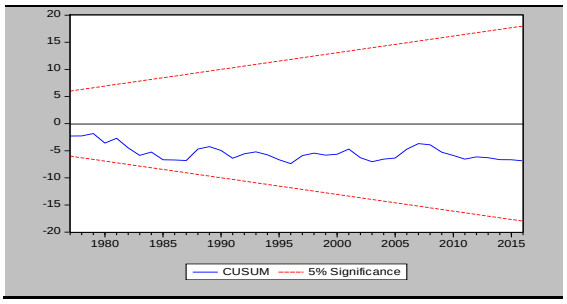
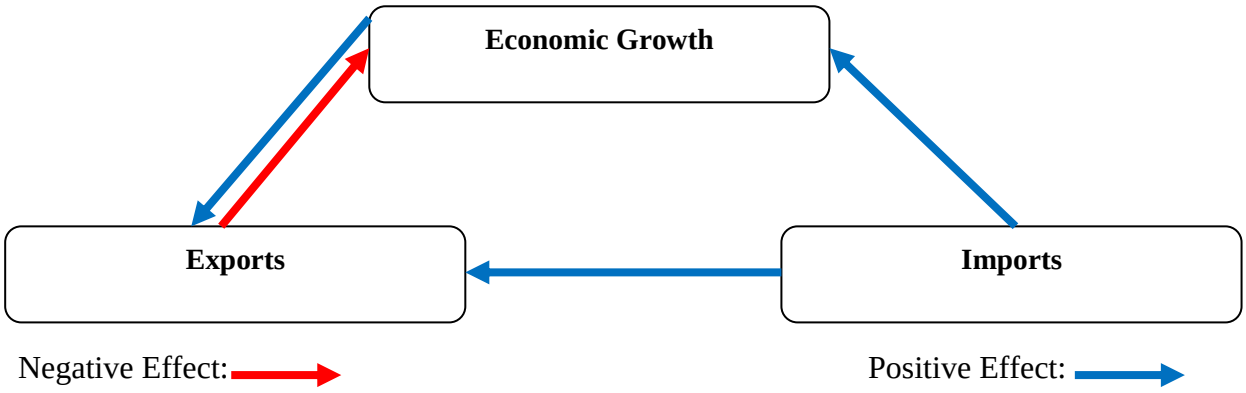


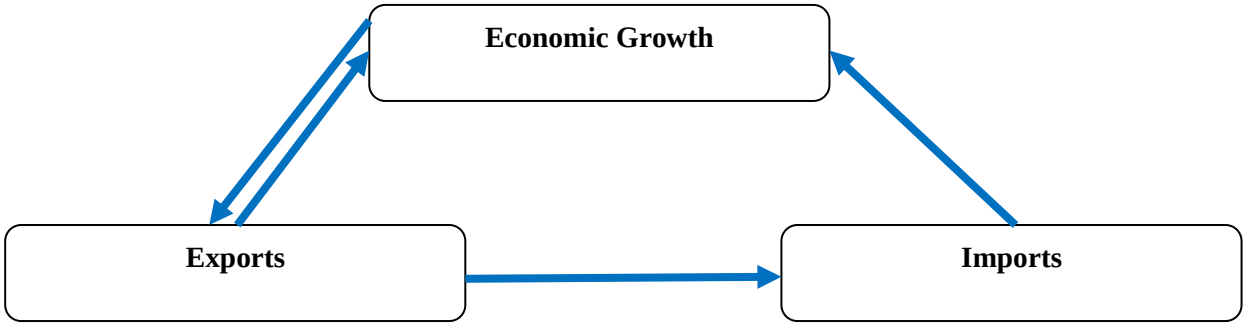
The test results of the stability VAR (CUSUM of Square Test) shows that the Modulus of all roots is less than unity and lie within the unit circle. Accordingly we can conclude that our model the estimated VAR is stable or stationary.



Graph 4: Long run relationship among exports, imports and economic growth

Fig 4 shows that in the long run exports have negative effect on economic growth. This confirms for example, the results showed by Tahir et al (2015) and Bakari (2017 b). Along the same lines, it has been organized for the work of Riyath and Jahfer (2016), Akter and Bulbul (2017) and Zahonogo (2017) that imports play an important role and positive effect to stimulate economic growth in the long run. Also, imports have positive effect on exports. This confirms the results analyzed by Akter and Bulbul (2017). Finally and concerning the linkage

in the long run, it seen that economic growth have positive effect on exports. This upholds the results proved by Sothan (2016).



Graph 5: Short run relationship among exports, imports and economic growth

Concerning the short run relationship, it seen that there is bi-directional causal relationship between export and economic growth. This argues the findings proved by Hussain (2014). In the same order of ideas, the results show that there is uni-directional causal relationship from exports to imports. This confirms the results indicated by Alaoui (2015). Also, there is uni-directional causal relationship from imports to economic growth. This upholds the results proved by Rahman and Shahbaz (2013), Bakari and Krit (2017).

V. Conclusion and Implication

For a long time developing countries have embarked on economic reforms to restore their trade and fiscal balances. At the same time, they have eased their economic frontiers by lowering the commercial gates. The open-growth relationship is interesting to analyze empirically since most theoretical work has not solved the positive or negative effect of openness on economic growth. On the other hand, it was found that the majority of empirical studies found positive effects of exports and the negative effects of imports on economic growth. Even the interrelations between these three variables are very complex and tangled. The aim of this study was to determine the three-way linkages between exports, imports and economic growth Tunisia during the period of 1965 to 2016. The cointegration analysis, VECM model and the Granger Causality tests are used here to look into the nexus between

exports, imports and economic growth in the long run and in the short run. First, Tunisian exports have a negative effect on economic growth; This explains, on the one hand that the distinction between the low added value of exports in a commercial environment characterized by the high level of competition, which in turn leads to a devaluation of the dinar. And on the other hand the increase in the value of imports relative to that of exports leads to the appearance of a balance of trade deficit, which leads to the reduction of reserves by deviating fragileness monetary liquidity in the Tunisian economy and this explains their negative impact on economic growth. Otherwise, and the negative effects of exports, on economic growth in Tunisia are the results of the visible absence of companies and advertising services to publish and let foreign countries know the Tunisian exportable products. On the other hand, Tunisia's trade agreements with the European Union have an unfavorable impact on the Tunisian economy, since Tunisia considers itself a very weak and non-modern country compared to the European country by taking into consideration the Competition in the trade of industrial products (which accounts for 80% of the share of total exports) on the European market, which sometimes obliges Tunisian companies to sell their industrial products at lower prices and sometimes these prices are lower than their production cost. Second, Tunisian imports play an important role and have a positive effect on stimulating economic growth. The theory of endogenous growth has emphasized the role of imports in economic growth Romer (1986) and Lucas (1988). From the theory, it is argued that imports can absorb foreign technology in the domestic economy; this increases the availability of intermediate goods and inputs. This includes machinery, human capital, skilled labor and equipment which, in general, can increase productivity in the Tunisian economy and especially that the majority of imports are industrial goods intended to increase the productivity of investment. Third, imports have a positive effect on exports. This means that the more the import weights increase the more exports increase. This scenario seems to be in line with reality because foreign or domestic investors in Tunisia actually import their primary materials; they produce goods and services and then export their products. Fourthly and finally, economic growth has a positive effect on exports. Economic growth leads to improved skills, skills and techniques, which contribute to the expansion of exports (Rodrik, 2000, Edwards 1992, Romer 1986, Lucas 1988, Becker et al., 1990, Otani and Villanueva, 1989, Grossman and Helpman, 1991). The case of Tunisia in this phase is similar to the

theoretical foundation since in this economy an increase in economic growth leads to an increase in domestic production and in this case a decrease in prices, which cause the increase in international demand. In the short run, our analyses show three principal findings. First, there is the bi-directional causal relationship between export and economic growth. Second, there is uni-directional causal relationship from exports to imports. Third and finally, there is uni-directional causal relationship from imports to economic growth. These results show that exports and imports are necessary to stimulate economic growth in Tunisia. In this case Tunisia must refinish its strategy of trade opening and especially their exports by encouraging productivity in the agricultural sector because according to the Tunisian Institute of Statistics Tunisia to exploit only 30% of the agricultural land with traditional means and technology that are not innovating.

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