Does Export to Japan Promote Economic Growth in Africa? A Panel Data Analysis

Gael Fokam

The Dschang School of Economics and Management, Dschang, Cameroon

***Abstract*: This study investigates how export to Japan affects economic growth in 8 African countries, namely: Algeria, Egypt, Morocco, Kenya, Liberia, Nigeria, South Africa and Tanzania for the period 2004 – 2016. For this purpose we employ Ordinary Least Squares (OLS), fixed effects (FE) and random effect estimations. The empirical evidence shows that export to japan positively affects economic growth of selected African countries. The above findings are broadly consistent with ELG hypothesis and most empirical studies.**

***Keywords:* Economic growth, export, Panel data, Africa**

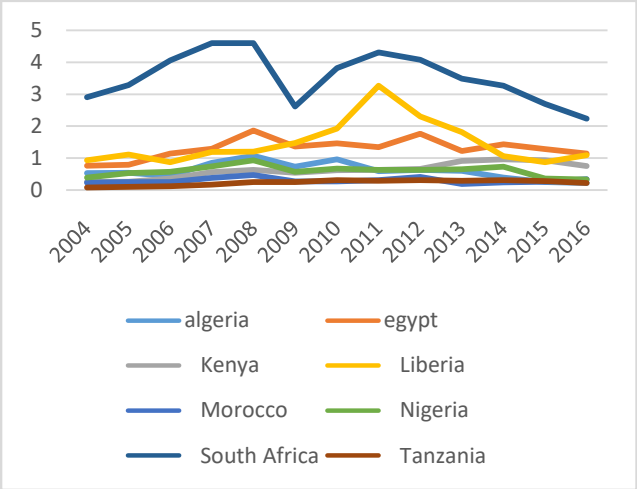
Jel Classification : O55 F14 F55

I. INTRODUCTION

Two main reasons motivate this inquiry, namely: (i) growth trends of Africa-Japan trade relationship and (ii) gaps in the literature.

First, since the first Tokyo International Conference on the Development of Africa (TICAD I) in 1993, trade relations between Africa and Japan have been discreet and timid. Under the pressure of the Chinese neighbour, with its "Go Global" strategy that allows China to cover all African countries, Japan tries to revitalize its trade relations with Africa. So, according to Fundira (2012), between 2002 and 2010 the cumulative growth of Japan's total trade with Africa increased by 27%, with export and import increasing by 28% and 30% respectively. However, the economic impact of export to Japan in Africa is not yet clear.

Figure 1: Export to Japan by countries, 2004-2016, in US$ million



Second, whereas the substantial part of the literature has investigated the economic impact of export in both developed and developing countries, scholarly focus on the impact of export to japan on economic growth of African countries is scarce. Accordingly, several studies have examined the theoretical link between export and economic growth. The export-led growth hypothesis argues that higher exports lead to higher economic growth for many reasons. First, exports relax binding foreign exchange constraints and allow increases in imported capital goods and intermediate goods (McKinnon 196). Second, export facilitate more competition, faster technological progress and allow poor countries with narrow domestic markets to benefit from economies of scale (Balassa 1978, Krueger 1980).Several empirical studies have tried to verify this hypothesis, but results still inconclusive. There is a branch of the literature which argues that export can accelerate overall economic growth and thus support the export-led growth theory (Balassa, 1978; Fosu, 1990; De Gregorio, 1992; Islam, 1998; Todaro 2000; Konya, 2004; Awokuse 2005; Vianna, 2016; Chia Yee Ee, 2016). Conversely, another stream of the literature reveals the possible negative correlation between export and economic growth (Jung and Marshall, 1985; Yamada, 1998; Konya, 2004), even the possibility of no correlation between export and economic growth (Ahmad and Kwan, 1991; Dodaro, 1993; Yaghmaian, 1994; Islam, 1998).

Although previous empirical studies have been concentrated on a large number of both developed and developing countries, the trade relationship between Japan and Africa has rarely been empirically studied. The literature on this subject has largely neglected this relationship due to the non-availability of consistent data. Our paper attempts to contribute to this literature by providing one of the first empirical studies on how export to Japan affects African economic growth.

The rest of this paper is organized as follows. Section 2 presents the data and the methodology, while section 3 provides the empirical results. Section 4 concludes.

II. LITERATURE REVIEW

Because of the potential economic benefits of export, such as comparative advantage, more competition and economic of scale (Balassa, 1978; Krueger, 1980), many African countries have engaged in export oriented strategy for the purpose of promoting economic growth (Nowak et al., 2007). Analysing

the relationship between export and economic growth has been a popular topic in the last decade (Judith and Williams, 2000). However, researchers have reached mixed and sometimes conflicting results in terms of export leg-growth hypothesis.

Examples of country specific studies include; Dritsaki and Stiakakis (2014) in their study on the Croatia find a bi-directional causal relationship between export and economic growth. While Bakari and Mabrouki (2017) report a unidirectional relationship running from Export to GDP in Panama, Gokmenoglu et al. (2015) by using the same method discover a unidirectional relationship running from GDP to export in Costa Rica. Considering that Panama and Costa Rica are similar in terms of economic development and the role of export in their economies, such conflicting results are unexpected. Chen (2007) found a bidirectional causal relationship in Taiwan. Pegkas and Tsamadias (2016), who report on a bidirectional causality in Greece, and Bakari (2017), who discovers an export led growth in Japan. Szkorupová (2014) examine the role of export in the long-term economic growth in Slovakia. Export-led growth hypothesis is confirmed through cointegration in Slovakia. The export-led growth hypothesis is confirmed through cointegration and causality testing in Malawi. As for Malawi, while Gunduz* and Hatemi-J (2005) find a unidirectional causality from export to economic growth using leveraged bootstrap causality tests for the period 1963–2002, Bakari and Krit (2017) suggest bidirectional causality between export and economic growth in Mauritania. Considering that these empirical studies are based on different countries, the inconsistent results may be a reflection of the country effect (Tang and Jang, 2009). Because countries can be different in terms of the weight of export on their overall economies.

In a cross-country study, Fosu (1990) examines the extent to which ELG hypothesis holds true for 28 African countries. By using pooled cross-sectional time-series estimation, results show that export growth is observed to exert a positive and significant impact on economic growth. Tekin (2012) applied a Granger Causality test on a panel of 18 Least Developed countries over the period 1970-2009, results show that the export-led growth hypothesis was supported for Haiti, Rwanda and Sierra Leone. For Angola, Chad and Zambia, results concluded that causality is a unidirectional running from GDP to export. Ee (2016) examine the validity of Export-Led Growth hypothesis in selected Sub-Saharan African countries for the period 1985-2014. Evidence indicates that there is a unidirectional causality relationship between export and economic growth in selected African countries, namely: Botswana, Equatorial Guinea and Mauritius. The study of Goh et al. (2017) empirically analyses the causality between export and economic growth on 11 Asian countries for the period 1970-2012. Granger causality test and Cointegration analysis show that export led-growth hypothesis is valid for China and Hong Kong. For India, Korea and Singapore, causality is running from GDP to export and the relationship is bi-directional for the others 6 countries. Ekanayake (1999) uses cointegration and error-correction models to analyse the causal relationship between export growth and economic growth in eight Asian developing countries using annual data from 1960 to 1997. Study provides strong evidence supporting the export-led growth hypothesis. The empirical results show that bi-directional causality exists between export growth and economic growth in India, Indonesia, Korea, Pakistan, Philippines, Sri Lanka and Thailand. There is also evidence for export-led growth in Malaysia. Abdullahi et al. (2013) examine the role of export on economic growth in 50 African countries for the period 1991-2011. Results show that export led-growth hypotheses is verified.

III. DATA AND METHODOLOGY

Data:

This study investigates a panel data regressions using yearly data from 2004 to 2016 to estimate the impact of export to Japan on economic growth. The sample consisted of eight African countries: Algeria, Egypt, Morocco, Kenya, Liberia, Nigeria, South Africa and Tanzania. These countries are chosen according to the weight they represent in trade with Japan and the availability of data. There are two sources of this data: (i) the World Development Indicators (WDI) released by World Bank; (ii) the Japanese External Trade Organization (JETRO).

Our dependent variable is GDP per capita. Export to japan is used as principal independent variables. In accordance with recent literature, we control for factors that may have a potential impact on economic growth, namely: import to japan, exchange rate, term of trade, domestic investment, foreign direct investment, population growth rate (Vianna, 2016). First, while import has been documented by Kim et al. (2007) increase economic growth, Vianna (2016) conclude on negative to reduce economic growth. Second the effect of exchange rate is also debatable. While Vianna (2016) have establish a positive relationship with economic growth in China,

The summary statistics, correlation matrix and definitions of variables have been disclosed respectively in Table 1, Table 2 and Table 3. It is apparent from the summary statistics that the variables are comparable from the perspective of mean values. Corresponding standard deviations show substantial variations. Therefore, we can be confident that reasonable estimated nexuses would be obtained from the regressions.

Table 1: Summary statistics

Variable	Mean	SD	Minimum	Maximum	Observations
logGDP	7.39	1.002	5.01	8.99	104
logExport	13.46	.9259	11.23	15.34	104
logImport	12.07	2.853	1.79	16.00	104
Pop	2.23	.729	1.12	4.18	104
logINVEST	3.05	0.371	1.697	3.764	103
logEXRATE	3.92	1.749	1.69	7.68	102
logTERM	4.90	.285	4.45	5.67	96
logFDI	21.11	1.404	16.87	23.17	102
SD: Standard Deviation					

Table 2: Correlation matrix

logGDP	logEXPORT	logIMPORT	logEXRATE	logTERM	logFDI	logINVEST	Pop	
1.0000	0.2968*	0.7660*	-0.5153*	0.4023*	0.6438*	0.1529	-0.7555*	logGDPP
	1.0000	0.1247	-0.5406*	0.1435	0.2248	-0.3450*	-0.2131	logEXPORT
		1.0000	-0.2308	0.3326*	0.6411*	-0.0662	-0.4333*	logIMPORT
			1.0000	0.1305	-0.2889*	0.1030	0.7243*	logEXRATE
				1.0000	0.5103*	-0.0277	-0.0624	logTERM
					1.0000	-0.1206	-0.4412*	logFDI
						1.0000	-0.2238	logINVEST
							1.0000	Pop
Note. *, Significance at 1% level.								

Table 3: Definitions of variable

Variables	Signs	Variable définitions (measurement)	Sources
GDP per capita	logGDP	Gross domestic product per capita	World Bank (WDI)
Export to Japan	logEXPORT	Export of goods and services to Japan	JETRO
Import from Japan	logIMPORT	Import of goods and services from Japan	JETRO
Population	Pop	Population growth rate	World Bank (WDI)
Domestic investment	logINVEST	Gross fixed capital formation as a percentage of GDP	World Bank (WDI)
Exchange rate	logEXRATE	Real effective exchange rate index	World Bank (WDI)
Terms of trade	logTERM		World Bank (WDI)
Foreign investment	logFDI	Foreign direct investment net inflows	World Bank (WDI)
JETRO: Japanese External Trade Organization.			

Methodology:

The purpose of our empirical analysis is to estimate the impact of export to Japan on Africa economic growth. To this end, our estimating equation was derived from the Solow–Swan growth model in the tradition of Vianna, 2016.

$$\log GDP_{i,t} = \alpha + \alpha_1 \log EXPORT_{i,t} + \alpha_2 X_{i,t} + u_{i,t} \quad (1)$$

Where i and t indicates countries and years, log stand for natural logarithm. GDP is the GDP per capita. EXPORT is the amount of goods and services export to Japan and the expectation is that more African export to Japan would be associated with an increase in economic growth measured by GDP per capita. $X_{i,t}$ is the vector of the control variables such as import from Japan, exchange rate, terms of trade, foreign direct investment, domestic investment and population growth

rate. $\mu_{i,t}$ is the error term, it is subdivided into two, such that $u_{i,t} = u_i + v_{i,t}$. u_i is the country unobserved specific effect and $v_{i,t}$ represents the idiosyncratic error, which captures other unaccounted factors that are not included in the model but have an effect on the dependent variable. Thus, Equation (1) can be rewritten as follows:

$$\log GDP_{i,t} = \alpha + \alpha_1 \log EXPORT_{i,t} + \alpha_2 \log IMPORT_{i,t} + \alpha_3 \log EXRATE_{i,t} + \alpha_4 \log TERM_{i,t} + \alpha_5 \log FDI_{i,t} + \alpha_6 \log INVEST_{i,t} + \alpha_7 POP_{i,t} + u_{i,t} \quad (2)$$

Where IMPORT represents the amount of goods and services coming from Japan. EXRATE is the official exchange rate, TERM represents the terms of trade, FDI stands for foreign direct investment, INVEST is the domestic investment measured by gross fixed capital formation as a percentage of GDP and Pop is the population growth rate.

Most variables are log transformed with the exception of the population growth rate. The coefficients are thus interpreted as elasticities. As described by Martínez-Zarzoso (2013), the use of a log–log model is also suited to handling dependent variables that are skewed to the right as is the case in this context.

Table 4: Export to Japan, 2004-2016 (US$ million)

Year	Algeria	Egypt	Kenya	Liberia	Morocco	Nigeria	South Africa	Tanzania	Total
2004	0,522	0,762	0,257	0,932	0,225	0,385	2,904	0,079	6,065
2005	0,538	0,792	0,253	1,112	0,245	0,522	3,287	0,096	6,845
2006	0,435	1,140	0,354	0,873	0,248	0,565	4,062	0,115	7,791
2007	0,851	1,287	0,551	1,190	0,371	0,732	4,599	0,166	9,746
2008	1,065	1,859	0,624	1,203	0,466	0,923	4,598	0,242	10,982
2009	0,723	1,360	0,534	1,473	0,261	0,564	2,613	0,250	7,777
2010	0,951	1,462	0,617	1,920	0,268	0,668	3,820	0,300	10,007
2011	0,584	1,337	0,623	3,266	0,307	0,623	4,311	0,284	11,335
2012	0,622	1,755	0,660	2,303	0,404	0,628	4,079	0,301	10,754
2013	0,596	1,221	0,915	1,817	0,184	0,649	3,482	0,287	9,152
2014	0,390	1,426	0,961	1,067	0,238	0,722	3,259	0,305	8,370
2015	0,248	1,285	0,927	0,873	0,259	0,359	2,692	0,275	6,917
2016	0,218	1,142	0,746	1,090	0,338	0,326	2,230	0,220	6,311
Total	7,742	16,828	8,022	19,120	3,816	7,666	45,936	2,921	112,052
Source : JETRO									

IV. RESULTS AND DISCUSSIONS

The preliminary estimation is carried out using OLS, panel fixed effects and panel random effects. Table 5 reports results using all three methods. We start with the simplest version of the model by examining if African economic growth is influenced by export to Japan. The results of our estimations are shown in Table 5. Three different methods have been used, namely: Ordinary Least Square (OLS), fixed effects (FE) and Random effects (RE). However, according to according to Hausman test, our estimations are done by fixed effect in Colum (2).

Column (2) shows that the coefficient of export is positive and statistically significant at the 1% level. Thus, a 1% increase in export to Japan leads to an increase in economic growth of 0.252%. This result is consistent with export –led growth theory and recent empirical literature. This finding corroborates the earlier findings of Vianna (2016) and Awokuse (2007) that a positive relation exists between export and economic growth.

Besides, other control variables also have a significant impact on economic growth of African countries. For example, results shows that exchange rate, terms of trade and domestic investment positively and significantly impacted on economic growth, implying that a 1% increase in these variables would increase economic growth by 0.896% , 0.752% and 0.367% respectively. Some of these conclusions are confirmed in column (2).

In table 6 we take into account the control variables, namely: the exchange rate, exchange terms, foreign direct investment and domestic investment. The results presented in Table 6 are consistent with the previous ones. It can be seen that all the coefficients associated with the export variable remain positive and statistically significant at the 1% threshold, regardless of the estimation method used, thus confirming the role of exports to Japan in the economic growth of African countries.

When we look at the control variables, with the exception of foreign direct investment, which is not significant, the signs of the other variables are consistent with the literature.

Table 5: Regression of export on economic growth

	OLS	Fixed effects	Random effects
VARIABLES	(1)	(2)	(3)
logEXPORT	0.452***	0.458***	0.452***
	(0.0842)	(0.0863)	(0.0842)
Constant	1.306	1.224	1.306
	(1.192)	(1.162)	(1.192)
Observations	104	104	104
R-squared	0,088	0.229	
Number of countries	8	8	8
Note. Standard errors reported in parenthesis. ***, significant at the 1% level.			

Table 6: Fixed effects and random effects estimations with control variables

Static panel data estimation			
Variables	Fixed effect	Random effect	Panel fully modified OLS
	(1)	(2)	(3)
logEXPORT	**0.252*** **	**0.155*** **	**0.243** **
	(0.0875)	**(0.0553)**	**(0.1104)**
logIMPORT	-0.0129	0.175***	-0.004
	(0.0240)	(0.0184)	(0.0285)
logEXRATE	0.896***	-0.0412	0.765***
	(0.187)	(0.0443)	(0.2262)
logTERM	0.752***	0.733***	0.632**
	(0.199)	(0.175)	(0.2642)
logFDI	0.0518	-0.00211	0.0556
	(0.0406)	(0.0417)	(0.0533)
logINVEST	0.367**	0.421***	0.384**
	(0.149)	(0.124)	(0.1811)
Pop	0.0454	-0.570***	-0.015
	(0.0910)	(0.0985)	(0.1202)
Constant	-5.386***	-0.224	
	(1.080)	(1.173)	
Observations	94	94	85
R-squared	0.665		0.96
Number of countries	8	8	8
Hausman test		**59.30*** **	
Country FE	YES		

Notes: Standard errors reported in parenthesis. ***, ** Denotes significance level at 1% and 5% respectively. Based on Hausman test, fixed effect model in colum (1) is chosen for this analysis.

V. CONCLUSION

The main objective of this paper was to investigate the impact of export to Japan on economic growth using panel data from 8 African countries over the period 2004-2016. Other variables such as, import, exchange rate, terms of trade, foreign direct investment, domestic investment and population growth rate were used as control variables. The results suggest that export has a positive and significant effect on economic growth. These results are consistent with export led-growth hypothesis and some existing empirical studies.

REFERENCES

[1] Abdullahi, Y. Z., Sokoto, A. A., & Safiyanu, S. S. (2013). Analysis of the relationship between foreign trade and economic growth in Africa. *Economics and Finance Review*, *3*(03), 01-10.

[2] Ahmad, J., & Kwan, A. C. (1991). Causality between exports and economic growth: empirical evidence from Africa. *Economics letters*, *37*(3), 243-248.

[3] Awokuse, T. O. (2005). Exports, economic growth and causality in Korea. *Applied Economics Letters*, *12*(11), 693-696.

[4] Awokuse, T. O. (2007). Causality between exports, imports, and economic growth: Evidence from transition economies. *Economics letters*, *94*(3), 389-395.

[5] Bakari, S. (2017). The nexus between export, import, domestic investment and economic growth in Japan.

[6] Bakari, S., & Krit, M. (2017). The Nexus between exports, imports and economic growth: Evidence from Mauritania. *International Journal of Economics and Empirical Research*, *5*(1), 10-17.

[7] Bakari, S., & Krit, M. (2017). The Nexus between exports, imports and economic growth: Evidence from Mauritania. *International Journal of Economics and Empirical Research*, *5*(1), 10-17.

[8] Bakari, S., & Mabrouki, M. (2017). Impact of exports and imports on economic growth: new evidence from Panama. *Journal of Smart Economic Growth*, *2*(1), 67-79.

[9] Balassa, B. (1978). Exports and economic growth: further evidence. *Journal of development Economics*, *5*(2), 181-189.

[10] Chen, S. W. (2007). Exactly what is the link between export and growth in Taiwan? New evidence from the Granger causality test. *Economics Bulletin*, *6*(7), 1-10.

[11] De Gregorio, J. (1992). Economic growth in latin america. *Journal of development economics*, *39*(1), 59-84.

[12] Dodaro, S. (1993). Exports and growth: A reconsideration of causality. *The Journal of Developing Areas*, 227-244.

[13] Dritsaki C and Stiakakis E (2014). Foreign Direct Investments, Exports, and Economic Growth in Croatia: A Time Series Analysis. Procedia Economics and Finance. 14 (2014) 181 – 190.

[14] Ee C Y (2016). Export-Led Growth Hypothesis: Empirical Evidence from Selected Sub- Saharan African Countries. Procedia Economics and Finance. 35 (2016) 232 – 240.

[15] Ee, C. Y. (2016). Export-led growth hypothesis: empirical evidence from selected Sub-Saharan African countries. *Procedia Economics and Finance*, *35*(2), 232-240.

[16] Ekanayake, E. M. (1999). Exports and economic growth in Asian developing countries: Cointegration and error-correction models. *Journal of economic development*, *24*(2), 43-56.

[17] Fosu, A. K. (1990). Exports and economic growth: the African case. *World Development*, *18*(6), 831-835.

[18] Fundira, T. (2012). Trade at a glance: the BRICS and Japan's with Africa.

[19] Giles, J.A, & Williams, C. L. (2000). Export-led growth: a survey of the empirical literature and some non-causality results. Part 1.

The Journal of International Trade & Economic Development, *9*(3), 261-337.

[20] Goh, S. K., Sam, C. Y., & McNown, R. (2017). Re-examining foreign direct investment, exports, and economic growth in asian economies using a bootstrap ARDL test for cointegration. *Journal of Asian Economics*, *51*, 12-22.

[21] Gokmenoglu, K. K., Sehnaz, Z., & Taspinar, N. (2015). The export-led growth: A case study of Costa Rica. *Procedia Economics and Finance*, *25*(1), 471-477.

[22] Gunduz*, L., & Hatemi-J, A. (2005). Is the tourism-led growth hypothesis valid for Turkey?. *Applied Economics Letters*, *12*(8), 499-504.

[23] Islam, M. N. (1998). Export expansion and economic growth: testing for cointegration and causality. *Applied Economics*, *30*(3), 415-425.

[24] Judith, A. G., & Williams, C. L. (2000). Export-led growth: a survey of the empirical literature and some non-causality results. Part 1. *Journal of International Trade & Economic Development*, *9*(3), 261-337.

[25] Jung, W. S., & Marshall, P. J. (1985). Exports, growth and causality in developing countries. *Journal of development economics*, *18*(1), 1-12.

[26] Kónya, L. (2004). Export-led growth, growth-driven export, both or none? Granger causality analysis on OECD countries. *Granger Causality Analysis on OECD Countries (August 17, 2008). Applied Econometrics and International Development*, *4*(1).

[27] Krueger, A. O. (1980). *Trade policy as an input to development* (No. w0466). National Bureau of Economic Research.

[28] Martínez-Zarzoso, I. (2013) "The log of gravity revisited" *Applied Economics* **45**, 311–327.

[29] Nowak, J. J., Sahli, M., & Cortés-Jiménez, I. (2007). Tourism, capital good imports and economic growth: theory and evidence for Spain. *Tourism Economics*, *13*(4), 515-536.

[30] Pegkas, P., & Tsamadias, C. (2016). How important are foreign and domestic investments, exports and human capital for Greece's economic growth?. *Economic Issues*, *21*(Part 1), 23-45.

[31] Szkorupová, Z. (2014). A causal relationship between foreign direct investment, economic growth and export for Slovakia. *Procedia economics and finance*, *15*, 123-128.

[32] Szkorupová, Z. (2014). A causal relationship between foreign direct investment, economic growth and export for Slovakia. *Procedia economics and finance*, *15*, 123-128.

[33] Tang, C. H. H., & Jang, S. S. (2009). The tourism–economy causality in the United States: A sub-industry level examination. *Tourism Management*, *30*(4), 553-558.

[34] Tekin, R. B. (2012). Economic growth, exports and foreign direct investment in Least Developed Countries: A panel Granger causality analysis. *Economic modelling*, *29*(3), 868-878.

[35] Todaro, M. P., & Smith, S. C. (2012). Economic Development. Addison Wesley.

[36] Vianna, A. C. (2016). The impact of exports to China on Latin American growth. *Journal of Asian Economics*, *47*, 58-66.

[37] World Bank (2017). World Development Indicator, the World Bank, Washington DC.

[38] Yaghmaian, B. (1994). An empirical investigation of exports, development, and growth in developing countries: Challenging the neoclassical theory of export-led growth. *World Development*, *22*(12), 1977-1995.

[39] Yamada, H. (1998). A note on the causality between export and productivity:: an empirical re-examination. *Economics Letters*, *61*(1), 111-114.