Export-led Growth Hypothesis in MINT Countries: A Panel Cointegration Analysis

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Abstract

The contribution of exports to GDP in MINT countries that improve substantially just after their implantation of export promotion strategy in the late 1980s raises the issue of whether the growth in these countries is led by export or not. While a good number of studies have been found investigating whether economic growth is promoted by exports for developing countries having an outstanding share of export in GDP, no study investigating the export-led growth hypothesis for MINT countries has been found until recent times. The main purpose of this study is to fill up the void. The study employs panel cointegration technique with an aim to examine whether the export is the key factor of economic growth for MINT countries employing yearly secondary data that covers the period. Results of the study imply that economic growth of these countries is considerably exports driven. Moreover, there is an indication of improvement of efficiency as exports work along with the rise capital formation. As the employment opportunity of an economy is expanded through capital formation, the emerging MINT countries endowed with large population and favorable demographics are expected to become the major exporters with strong GDP growth by being able to attract adequate foreign investment.

1 Introduction

ELG hypothesis that studies whether exports are a fundamental element to stimulate growth in developing countries has been the topic of interest of plenty of studies over the last few decades. Export can foster economic growth by confirming better resource allocation, cost advantages and productive efficiency (Kruger, 1975; Williamson, 1978; Balassa, 1978; Bhagawati, 1982; Srinivasan, 1985; Awokuse, 2003). Therefore, despite the cut in investment in other sectors, greater investment in export sector is expected to have a substantial positive impact on the economy. Moreover, exports help increase imports of *equipment*, *raw materials* and *technologies* necessary for an economy, which allows an economy to increase its investment that results in higher output (Rana & Dowling, 1990).

The macroeconomic policies of most of the developing economies were characterized as closed until the late 1960s. Even the East Asian countries were not the exception. All they were following import substitution industrialization policy that was successful in achieving the socio-economic objectives and economic growth. By the early 1970s, there was considerable doubt about the acceptability of import substitution industrialization as a measure to realize the development objectives due to its certain limitations in promoting the growth of industrial sector of domestic economy. It is inevitable to import *equipment*, *raw materials* and *technologies* to enhance the production capacity of an economy, and hence import substitution industrialization cannot completely eliminate the need for import. Moreover, as import substitution industries were not exposed to international competition, it resulted in a production process which is incompetent.

MINT is a group of countries tipped as the next economic powerhouse because of their bright economic prospects for the future. Common features that all MINT countries (Mexico, Indonesia, Nigeria and Turkey) share are their growing population, which is a potential source of young labor in coming decades for growing faster, and geographical position suitable for taking advantage of large markets nearby. Mexico is sharing its border with US and also neighbors to Latin America, Indonesia is located at the center of South-east Asia profound link with China, Turkey is a bridge between West and East. Though not yet obvious, but with the expansion of the economies in this continent, Nigeria, the largest economy in Africa, has the potential of becoming the hub of Africa's economy owing to the endowment of natural resources, massive population, well-controlled and well-capitalized banks, and scope to spread retail credit. Apart from these, MINTs are fortunate enough to have systems supportive to industrial development and business growth and they are not overly dependent on a single industry.

MINTs have become the major exporters of raw and finished goods since after their inauguration of outward-oriented or export promotion strategy in the late 1980s. Presently, the export sector of these countries have substantial contribution to their GDP. In the 2010s, Mexico's export is 32.2 percent of GDP, Indonesia's 23.98 percent, Nigeria's 22.53 percent and Turkey's 25.49 percent. Therefore, it is commonly expected that exports are the main driving force of economic development of these countries. While a good number of studies have been found investigating whether exports promote the economic growth of developing countries having an outstanding share of export in GDP, no study investigating the ELG hypothesis for MINT countries has been found until recent times. Hence, the study mainly aims to examine whether exports are the core element of growth of MINT countries.

2 Export Growth and Overall Macroeconomic Performance of MINT Countries

Prior to study the starring role of export in growth of MINT countries, a precise evaluation of the performance of growth and exports of these countries over the past two decades will be appropriate as all of these economies have undertaken structural reform programs as a key for growth emphasizing liberalization and promotion of exports since the 1990s (Thornton, 1996; Nguyen et al., 2013; Alimi & Muse, 2012; Rahmaddi & Ichihashi, 2011).

Mexico: Trade liberalization in Mexico began in the early 1980s through a range of economic reform initiatives undertaken by Mexican government following the dramatic balance of payment crisis. Country's decision to join the GATT in 1986 together with the enactment of NAFTA in 1994 reduced the tariff and non-tariff barriers considerably. Besides, since 1985, initiatives like facilitating imports of *equipment*, *raw materials* and *technologies*, ensuring exporters' easy and better access to credit and removal of barriers to the use of export earnings promote non-oil exports. Consequently, during the period 1991–2015, exports grew at 8.4 percent per year, as percent of GDP, it was 10.7 percent in 1991 but at the end of 2015 it climbed to 36.5 percent. Imports grew at over 8 percent, climbing from 11.5% to 35.1 percent of GDP. On the export side, manufactures were the leading sector. Its manufactures mounted to around 80 percent in the early 2010s from 38% of total exports at the beginning of liberalization in 1987 (Ibarra, 2010).

Nigeria: The failure of the policies to promote Import Substitution Industrialization prior to the 1980s led Nigeria to adopt export promotion industrialization strategies as part of its Structural Adjustment Programme (SAP) in 1986. This policy is nowadays followed with the objective of translating it into economic growth and considerable efforts have been given and are still being continued to boost production of domestic exports particularly in sectors other than oil sector with regard to increase the variety of products in the country export structure. Exports of agricultural products were the main source of foreign exchange during the 1960s and 1970s. But crude oil turned out to be the core export item from the mid-1970s which now founds nearly 96 percent of total export. However, there is a declining share of non-oil exports, from about 48% in 1970 to about 7% in 2015. Concerning the contribution of non-oil export to GDP, the downgoing trend reached from 7% in 1970 to 1.09% in 2015 (CBN Statistical Bulletin, 2015). Hence the performance of the non-oil export sector in the recent decades is not impressive (Ojide et al., 2014). Consequently, in spite of the development in Nigeria's total exports earnings, the country has been encountering a significant amount of deficit in the balance of payment over the years (Alimi & Muse, 2012). Main problems that are hindering the non-oil exports of Nigeria are poor funding for export promotion schemes, inefficient implementation, and corruption. Besides, lack of government support and subsidies for non-oil export sector are also mentionable.

Exports & Imports	**1980s**	**1990s**	**2000s**	**2010s**
Exports of goods and services	% of GDP			
Turkey	13.30	18.34	23.34	25.49
Mexico	16.40	20.40	26.16	32.20
Indonesia	25.08	30.51	32.39	23.98
Nigeria	22.41	34.60	38.22	22.53
Imports of goods and services	% of GDP			
Turkey	16.42	21.33	25.34	31.00
Mexico	13.00	20.99	27.61	33.48
Indonesia	23.31	28.21	26.93	23.54
Nigeria	14.81	24.97	26.46	14.67

Table 1: *Performance of Export and Import in MINT Countries.* ***Sources:*** *Authors' Calculation from World Development Indicators, World Bank, 2017*

Turkey: From the beginning of the 1980s, Turkey adopted policies in order to achieve an economic system which is more liberal and market-oriented. As part of the policies, government undertook a growth strategy conducive to promote export and the external competitiveness of the economy was preserved through management of exchange rate and export subsidies. These primary initiatives undoubtedly helped regain the confidence of international creditors. The stand-by loans provided by IMF along with the adjustment loans of World Bank were promptly arranged and disbursed together with supplementary debt relief operations (Taş and Kar, 2002:41). On the other hand, the gradual but deliberate reduction in real wages in 1980s targeting to generating an exportable surplus enhance the competitiveness of export with lower labor costs (Taban S. & Aktar, 2008). These export-promoting strategies were successful in enhancing exports substantially. Its exports reach to 25.5 percent of GDP in the 2010s from 13.3 percent in 1980s at a 7.6 percent annual growth rate.

Indonesia: Export promotion in Indonesia was embarked on 1985 in response to the breakdown of import substitution industrialization due to the fall in oil prices throughout the period of first half of the 1980s that exhausted the gains that Indonesia achieved due to the mid-70s oil boom. The economy experienced a quick surge in foreign direct investment owing to the intrepid and influential series of outward-oriented reform programs

undertaken from the mid-1980s ahead. Owing to the reduction and removal of tariff as well as non-tariff barriers, manufacturing exports raised five times in 9 years from that of 1985 (Rahmaddi & Ichihashi, 2011). However, regardless of the fall of manufacturing exports during Asian economic crisis in1998, it maintained a modest real GDP growth rate over 5 percent with more that 22 percent share of exports in GDP through 2000 to 2015.

3 Literature Review

There has been a good number of empirical studies on the export-growth relationship based on both time series as well as panel data. The results of the studies backed by time series data are inconclusive as some of them suggest that ELG hypothesis is valid for certain countries while it is not the case for others. While Medina-Smith (2001), Hossain & Karunaratne (2004), Siliverstovs & Herzer (2006), Baharumshah and Almasaied (2009) and Balcilar & Ozdemir (2013) find evidence to support ELG hypothesis, studies include Chang et al. (2000), Awokuse (2008), Ahmed and Uddin (2009), Mishra (2011) and Malhotra & Kumari (2016) oppose it. In addition, Shan and Sun (1998), Awokuse (2005) and Paul (2014) find that the causality between exports and GDP growth is bidirectional. Among the panel cointegration analysis, Sharma and Smyth (2009), Seabra and Galimberti (2012), Chandra Parida and Sahoo (2007), Biyase and Zwane (2014) and Olson (2014) find exports as a driving force of economic growth, but Bahmani-Oskooee et al. (2005) and Pazim et al. (2009), did not find sufficient evident to support evidence of the earlier studies.

Results obtained from the studies on MINT countries employing time series data are also inconclusive. Studies mainly rely on *Granger causality test* with the aim of justifying the ELG for MINT countries. Studies that support ELG of MINT countries include McCarville & Nnadozie (1995), Thornton (1995), Lorde (2011), Ozturk and Acaravci (2010), but the hypothesis is opposed by Nguyen et al. (2013), Taban and Aktar (2008), Thangavelu and Rajaguru (2004), Alimi (2012). In addition, Lorde (2011) finds an inverse association between exports and GDP for Mexico. Granger causality from real GDP to exports is found to be unidirectional in the study of Nguyen et al. (2013) for Turkey and Alimi & Muse (2012) for Nigeria. Taban and Aktar (2008) identify a bidirectional causality relationship between real GDP growth and growth of exports in Turkey not only in the short run but also in the long run. The same result is found by Alimi (2012) for Nigeria, while Ojide et al. (2014) finds sufficient evidence in support of non-oil ELG hypothesis beyond the ELG hypothesis in Nigeria based on autoregressive distributed lag (ARDL) model and co-integration analysis. However, there is no study found addressing whether the growth of MINT countries are essentially driven by export making use of panel cointegration analysis and the study is an attempt to fill up the void.

4 Data Sources and Methodology

The study considers yearly data accumulated from secondary sources to examine the ELG hypothesis for MINT countries. The balanced panel consists of data for export, import, gross capital formation and GDP for MINT countries for the period of 1986-2015 and data of each variable is measured in US dollars. Data are in real form considering the base year 2010. The data are collected from World Development Indicators, World Bank.

A substantial amount of *equipment*, *raw materials* and *technologies are imported by all the MINT countries to support their local production and also exports. Therefore, it will be appropriate to include import as a component in the estimation of growth. To assess the change in the efficiency of production, the study also considers the stock of physical capital as dependent variable. But the stock of physical capital is proxied by* gross fixed capital formation mainly *due to the limitation of data and* complications in measuring the stock of physical capital. Hence the theoretical model for the study to examine the export-growth relationship can be given by-

$$\ln y_{it} = \alpha_i + \partial_i t + \beta_{1i} \ln EXP_{it} + \beta_{2i} \ln IMP_{it} + \beta_{3i} \ln CAP_{it} + \varepsilon_{it} \qquad (1)$$

Where y is gross domestic product, EXP is export, IMP is import and CAP is gross fixed capital formation. All the variables are in real form. The probable sign of β_{1i}, β_{3i} is positive and β_{2i} is negative.

The limitation of pure time series and pure cross section analysis is that they are not able to detect all the information available in data while estimating the equations, which is not the case for panel data techniques. That is why the study estimates the export-growth relationship employing the panel cointegration technique. Moreover, coefficient estimates in panel data estimation are superior to time series estimation due to the increase in the power of the tests for small data span, provided that the sample covers only 30 observations for each of the countries. The study begins with panel unit root test for each series, applying Im et al. (1997) (IPS) techniques.

Different methods are used for the test of panel cointegration. The null hypothesis of no-cointegration is assumed in the Engle & Granger (1987) tests and stochastic disturbances produced from the panel regression are used. This method is employed in the panel cointegration tests offered by Pedroni (1997), McCoskey & Kao (1998). Kwiatowski et al. (1992), Harris & Inder (1994) and Shin (1994) proposed another method that considers the null hypothesis of cointegration. Heterogeneity in the cointegrating coefficients is permitted by all these tests of panel cointegration. Primarily, the two-step methodology offered by Engle–Granger is performed for panel cointegration

tests where unit root tests are directly applied to the residuals. However, this procedure yields biased test statistics towards accepting stationarity (Pedroni, 1997). Pedroni (1997) challenges the suitability of applying panel unit root tests directly to the regression residuals for several reasons that include lack of exogeneity of the regressors and the residuals are dependent on the distribution of the estimated coefficients. As a result, it is necessary to have a robust test procedure for cointegration in the presence of heterogeneity as an alternative. The study prefers to employ the cointegration test offered by Pedroni which permits considerable heterogeneity. After testing for cointegration, analysis of equation (1) will be the next issue to be addressed. Fully-Modified OLS (FMOLS) approaches can be applied to attain the panel data estimates for β_i. For heterogeneous panel with I(1) variables, application of this methodology is able to produce results superior to OLS. Its distribution is standard and follows the asymptotic properties of unbiasedness. Moreover, FMOLS performs better in producing consistent standard errors and therefore consistent t-statistics that the OLS estimator could not yield.

5 Empirical Results and Discussion

Table 2 summarizes the IPS panel unit root test results both at levels and at first difference. The results of the panel unit root tests imply that there is no way of rejecting the null hypothesis of non-stationarity at log level for all variables. Therefore, all the variables considered for the study are stationary at their first difference level.

Variable	Level		First Difference		Decision
	Intercept	Intercept and Trend	Intercept	Intercept and Trend	
GDP	1.304 (0.904)	-0.384 (0.350)	-7.350* (0.000)	-5.719* (0.000)	I(1)
Export	0.819 (0.794)	0.265 (0.604)	-10.057* (0.000)	-9.301* (0.000)	I(1)
Import	-0.298 (0.383)	-0.783 (0.217)	-10.193* (0.000)	-9.972* (0.000)	I(1)
Capital	1.643 (0.949)	-1.190 (0.117)	-6.940* (0.000)	-7.859* (0.000)	I(1)

Table 2: *Im, Pesaran, Shin (IPS) Unit Root Test*

Since all the variables are stationary at first difference level, panel cointegration test can be conducted. As all the variables are integrated at same order, i.e. I(1), Pedroni's panel cointegration tests can be applied in order to examine the long-run equilibrium relationship among the variables. The findings of cointegration analysis based on equation (1) are reported in Table 3. The null hypothesis of non-cointegration against the alternative of cointegration is rejected in the case of equation (1) as both panel-adf and group-adf statistics are significant at 10% and 5% levels respectively. Apart from the adf-statistics, the results also imply significant panel-v and panel-pp statistics. The Kao test also rejects the null hypothesis- no cointegration as shown in table 4.

Test	Intercept	p-value	Intercept and Trend	p-value
Panel v-Statistic	3.026754*	0.0012	8.734528*	0.0000
Panel ρ-Statistic	-1.756703*	0.0395	-0.533290	0.2969
Panel pp-Statistic	-3.404520*	0.0003	-2.107805*	0.0175
Panel adf-Statistic	-3.588756*	0.0002	-2.074851*	0.0190
Group ρ–Statistic	-0.330245	0.3706	0.653217	0.7432
Group pp-Statistic	-1.892615*	0.0292	-1.193529	0.1163
Group adf-Statistic	-1.898885*	0.0288	-1.170090	0.1210

Table 3: *The Pedroni Panel Cointegration Test*

	t-Statistic	Prob.
ADF	-4.205	0.0000
Residual variance	0.002	
HAC variance	0.002	

Table 4: *Kao Residual Cointegration Test*

Overall cointegration results suggest that there exists a long run cointegrating relationship among the variables. Therefore, long run cointegrating relationship can be estimated. Table 5 summarizes the findings of group FMOLS of equations (1). Results lead to the inference that the coefficients hold the signs theoretically expected that are also statistically significant. Hence, the growth of MINT countries as a whole is export driven, but whether it differs from individual country experiences requires investigation.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNX	0.783915	0.084726	9.252324	0.0000
LNM	-0.610561	0.085294	-7.158347	0.0000
LNFK	0.888235	0.051250	17.33139	0.0000

Table 5: *Panel Fully Modified Ordinary Least Squares (FMOLS)*

To compare the findings with individual countries, the study estimates FMOLS for each of the countries separately and the outcomes are presented in table 6. The long-run coefficients are required to bear expected sign export led growth hypothesis to be valid, that is, both export and capital should have positive coefficients while import coefficients should be negative.

All long-run coefficients are correctly signed and statistically significant for Mexico, Indonesia and Turkey with an exception for Nigeria. For Nigeria, both export and import variable have positive coefficients that are statistically significant meaning that they both have positive influence over economic growth. Hence, while Mexico, Turkey and Indonesia pass the test for ELG hypothesis, it is not the case for Nigeria, however, a positive growth effect of export is evident.

Country	Variable	Coefficient	t-Statistic	p-value	R-square
Mexico	Export	0.3596	6.5140	0.0000	97.14%
	Import	-0.545	-10.7032	0.0000	
	Gross Fixed Capital	1.2454	53.4725	0.0000	
Indonesia	Export	1.2936	6.3966	0.0000	95.72%
	Import	-0.7575	-3.5682	0.0015	
	Gross Fixed Capital	0.5125	8.9855	0.0000	
Nigeria	Export	0.8889	10.4260	0.0000	89.79%
	Import	0.1169	1.8653	0.0739	
	Gross Fixed Capital	0.0584	0.5881	0.5617	
Turkey	Export	1.0190	7.2302	0.0000	94.46%
	Import	-1.0798	-8.0925	0.0000	
	Gross Fixed Capital	1.1346	19.0668	0.0000	

*Note: * Variables are in logarithmic form*

Table 6: *Time Series Evidence of ELG for Individual Countries: Results of FMOLS*

If we compare the results of individual economies as stated in table 6 with that of the panel FMOLS stated in table 5, the results are quite consistent as they have similar outcomes in terms of expected sign and significance except for Nigeria. The statistically significant export coefficients for the group and individual economies stand to mean that exports cause economic growth of MINT economies. Moreover, as exports contribute to economic growth along with an increase in the formation of capital both for group and individual economies confirmed by the statistically significant coefficient of the gross fixed capital variable used as a proxy of investment, it is an indication of an improvement of efficiency in MINT countries.

6 Conclusion

The paper investigates the hypothesis of ELG for MINT countries employing panel cointegration analysis and finds evidence in support of export led growth. From the policy perspective, the results of the study bear important significance. As observed, economic growth of MINT countries is essentially export driven and hence paying more attention to the promotion of exports will help materialize the long-term development objectives of the economy. Besides, movement investment and exports in the same direction, which is positive, is an indication of increase of efficiency in production in MINT countries which collaborates them to remain competitive in the international market. Being an addition to the physical stock of capital, investment leads to greater productive capacity of an economy and thereby expands the capacity of an economy to generate employment. Because of having large population and favorable demographics, emerging MINT countries are expected to become the major exporters with strong GDP growth by being able to attract adequate foreign investment.

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