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THE IMPACT OF TRADE OPENNESS ON MANUFACTURING SECTOR PERFORMANCE: EVIDENCE FROM MALAYSIA

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Abstract
Trade openness plays a vital role in boosting the production of the manufacturing sector. Two opposing perspectives identify trade-growth nexus. One posits that trade openness will stifle industrial productivity while the opposing view believes that manufacturing productivity can be enhanced by a trade liberalization regime. This study investigates the instantaneous and jointly dynamic effect of trade openness along with macroeconomic variables (i.e., Malaysian exchange rate and average lending rate) and the event of economic crises on manufacturing sector performance in Malaysia using data from 1981 to 2016. This study employed a distributed lag model. The Augmented Dickey-Fuller (ADF) unit root test was adopted to determine the stationarity of time series data. The empirical results revealed that the effect of both instantaneous and the jointly dynamic effect of the percentage change in trade openness on manufacturing production growth in Malaysia are positive and significant. However, the effects of the percentage change in exchange rate and percentage change in average lending rate are insignificant. Economic crisis has a significant negative impact on Malaysian manufacturing production growth. Therefore, the results strongly recommend that the direction of trade policy in Malaysia should be formulated based on outward-looking strategies.

Keywords. *Trade openness; manufacturing production growth; distributed lag model.*
JEL Codes. *F10; L69.*

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Introduction

Trade liberalization policy plays a significant role in explaining growth theory in developing countries (Dutta & Ahmed, 2004; Iftikhar, 2012; Manwa & Wijeweera, 2016). Trade openness has been considered as a key element in the integration of the world economy. According to Edwards (1998), trade liberalization policies are the important instrument for developing countries to foster and enhance growth. However, some economists debated whether more trade openness would positively or negatively affect economic growth (Kawai, 1994; Stiglitz, 2004). In general, two divergent perspectives on trade-growth nexus can be identified. In the analysis of trade policy, the infant industries argument is an exception to the free trade (Shafaeddin, 2000). It suggests that the protection of infant industries or an inward-looking strategy is necessary in the early stage of industrialization if some countries outdistance others in manufacturing, and the industrial protection should be temporary be targeted and not excessive. However, the opposing view believes that trade liberalization is intended to promote exports and productivity by exploiting comparative advantages that can be gained through the exposure to foreign competition, enhanced technical development, and access to economies of scale (Jayanthakumaran, 2002).

Since Malaysia is a small nation, it is vital to promote growth. After independence, the Malaysian government adopted the Import Substitution Industrialization Strategy (ISI) from 1957 to 1969 and from 1981 to 1986 (Kinuthia, 2009). The transformation of trade policy from Import Substitution Industrialization to outward orientation could be an important factor that

contributed to the Malaysian manufacturing production growth. The leverage of trade openness policy is important in formulating trade policy.

Macroeconomic instability is an important factor affecting productivity growth. The depreciation of domestic currency may have a positive impact on manufacturing production growth. However, Aghion, Bacchetta, Rancière, and Rogoff (2009) argue that the effect of exchange rate on real output is small or insignificant. On interest rate, a high interest rate is always viewed as unfavourable because it tends to lead to low productivity growth in a country. Thus, implementing a complementary policy to control the exchange rate and interest rate is essential to boost manufacturing productivity growth.

The economic crises have a significant influence on real output (Kapp & Vega, 2014). Malaysia suffered three major economic crises: the commodity shock 1985-86, the Asian financial crisis 1997-98, and the global financial crisis 2008-09 (Athukorala, 2010). In reviewing trade liberalization policy and the complementary policy reforms, the impact of trade openness and macroeconomic determinants on manufacturing sector performance should be investigated. A specific focus on examining the instantaneous and jointly dynamic effect should be given so that policymakers could implement relevant policies to prevent the shocks associated with future economic crises.

This study examines the instantaneous effect and jointly dynamic effect of trade openness, macroeconomic determinants, and the event of economic crises on manufacturing sector performance in Malaysia. The result may help policymakers determine whether the implementation of an inward-oriented trade policy or an outward-oriented trade policy and a complementary macroeconomic policy can improve manufacturing productivity.

Literature review

Two diverging views and arguments can explain the impact of trade openness on manufacturing sector performance. The first view is the infant industry argument for industrial protection. Economists have long regarded this argument as theoretically valid for the case of trade liberalization (Yanagihara, 1982). The trade liberalization policy that opens up the domestic market will bring foreign competition to domestic economy. The increases foreign competition will force infant industries close down and suppress domestric manufacturing productivity. The growth of infant industries in a home country is inhibited by low costs from foreign countries. In practice, the argument of infant industries is put forth more frequently in developing countries. Succar (2006) supports the need for interventionist trade protection policies to protect infant industries. He further explains the condition of trade interventionist policy of a nation. The infant industry should be protected because it is relatively incapable of competing with established foreign firms.

In contrast, some scholars favour an opening trade policy because trade liberalization policy could enhance productivity growth through efficiency in resource allocation with exposure to import competition and the adoption of foreign technology in domestic industries (Paus, Reinhardt, & Robinson, 2004). That is, the theoretical arguments of trade liberalization stress that an increase in industrial productivity could be achieved due to X-efficiency, technological catch-up, and economies of scale (Haddad, 1993; Umoh & Effiong, 2013).

A review of some previous studies is provided as follows. Chandran and Munusamy (2009) evaluated the relationship between trade openness and manufacturing growth in Malaysia that covered the period of 1970 to 2003. The study adopted a more recent co-integration test called

the bounds test to establish if the variables are co-moving. The results revealed that trade openness, fixed capital, and labour have a long-run positive relationship with Malaysian manufacturing growth. Besides that, Madhavan, Vengedasalam, Sundram, and Pandiyan (2006) examined the trade-growth relationship in Malaysia that covered the period of 1963 to 2003. They found that trade liberalization and labour have a positive relationship with manufacturing output growth in Malaysia.

Umoh and Effiong (2013) performed a sector-specific analysis to evaluate trade-growth nexus in Nigeria that covered the period of 1970 to 2008. They adopted the bound test and ARDL co-integration approach. They revealed that interest rate spread has a significant negative effect on manufacturing production in the long-run, while trade openness and nominal exchange rate have a significant positive relationship with manufacturing production. Adamu (2014) found that trade openness and inflation rate positively and negatively impact industrial production, respectively, in Nigeria. However, nominal effective exchange rate has no relationship with industrial production. Onakoya, Fasanya, and Babalola (2012) revealed that trade openness has a positive impact on manufacturing output growth, while exchange rate and inflation rate have a negative impact on manufacturing output growth.

Bandara and Karunaratne (2013) conducted a study to investigate the impact of policy reforms on the total factor productivity (TFP) of manufacturing industries in Sri Lanka. The authors found that the post-1977 pursuit of the outward-looking export-oriented industrialization (EOI) strategy has a positive relationship with TFP growth. In Iran, Fazlzadeh and Seif (2012) found that fixed capital, labour, and trade openness have a positive relationship with Iran's manufacturing growth in the long run. Kim (2000) found a positive relationship between trade liberalization and Korean productivity performance. However, the productivity increase is not significant because trade liberalization is not substantial enough in Korea.

Nazli, Siddiqui, and Hanif (2018) revealed that trade liberalization, human capital, and investment have a positive and significant effect on productivity growth in Pakistan through the channels of learning by doing, knowledge spill-overs, technology diffusion, and transformation. Ahmed, Khan, and Afzal (2015) employed the two-stage least squares (TSLS) method. The result revealed that trade liberalization indicated by excise duty has a positive but negligible impact on total factor productivity in both pre- and post-liberalization periods. However, the effective rate of protection has a negative relationship with TFP over the study periods.

Chete and Adenikinju (2002) found a positive correlation between trade liberalization and productivity growth in Nigeria, which implies that trade liberalization enhances productivity growth in the Nigerian economy. Mahadevan (2002) revealed that trade liberalization has a positive and significant effect on technological progress in Australia. Wong (2009) found a positive and significant relationship between trade openness and the productivity of manufacturing industries in Ecuador of export-oriented industries in the years after the implementation of trade reforms. However, there is a negative and significant relationship between export-oriented industry and 2001-2003 dummy due to the omitted class of non-tradables in the 1997-1998 period.

In short, there are two divergent views on the effect of trade openness. One view posits that trade openness will stifle industrial productivity while the opposing view believes industrial productivity could be enhanced by opening the trade regime. Past studies seem to suggest a positive impact of trade openness on the performance of the manufacturing sector.

Theory and conceptual framework

The objective of the current study is to investigate the impact of trade openness on manufacturing sector performance in Malaysia along with some macroeconomic variables (i.e., nominal exchange rate and lending interest rate) and the event of economic crisis. The impact of trade openness and the main macroeconomic variables can be expressed as follows:

$$MPI = f(OPNS, MEXC, ALR, CRISIS)$$

where *MPI* is manufacturing production index, *OPNS* is trade openness, *MEXC* is Malaysian exchange rate, *ALR* is average lending rate, *CRISIS* is the dummy variable assigned one for the period of economic crisis and zero for other periods. In investigating the trade-growth nexus, the current applied manufacturing production index as a proxy to the manufacturing sector performance, following Umoh and Effiong (2013). The ratio of the sum of the value of imports and exports of goods to GDP is the measure of trade openness, following Adamu (2014).

The association between trade openness and manufacturing sector performance is expected to be positive. Trade liberalization generally induces X-efficiency, economies of scale, capacity use, increased competition, and technological catch-up in the manufacturing sector (Haddad, 1993).

The relationship between Malaysian exchange rate and manufacturing sector performance is expected to be ambiguous. This is because changes in exchange rate lead to changes in import-sides and export-sides simultaneously. The impact of exchange rate depends on the magnitude of export intensity and import input. Thus, the effect of exchange rate on manufacturing production growth is uncertain.

The lending rate is expected to have a negative effect on the performance of the manufacturing sector. The adverse effect emerges because the high interest rates are influenced by the monetary policy, which tends to discourage investment. This situation, in turn, hinders technological changes and creates an unfavourable environment for businesses.

Lastly, the economic crisis is expected to have a negative effect. Economic crises create risks for business management in uncertain times, which, in turn, hinder the productivity growth of the manufacturing sector.

Methodology and data

First and foremost, the unit root test was performed to check the stationarity properties of the time series data. Augmented Dickey-Fuller (ADF) unit root tests that include a constant and a constant and trend were carried out in the study. The purpose of the unit root test is to ensure none of the variables is *I(2)* although all the time series data had first been differenced in this study.

Based on theory and conceptual framework discussed, a distributed lag model was adopted to evaluate the instantaneous effect and jointly dynamic effect of the explanatory variables on manufacturing sector performance in Malaysia. Consider the equation below:

$$\Delta lnMPI_t = \beta_0 + \sum_{i=0}^{k} \beta_{1i} \Delta lnOPNS_{t-i} + \sum_{i=0}^{k} \beta_{2i} \Delta lnMEXC_{t-i} + \sum_{i=0}^{k} \beta_{3i} \Delta lnALR_{t-i} + \beta_4 CRISIS_t \quad (1)$$

where β and ε in the equation represent coefficient and error term, respectively. All variables except *CRISIS* were transformed into a logarithm form written as lower case *ln* in the equation. The subscript, *t-i*, represents the lags period in the study. For the dynamic effect, two lags time period was selected as the length of lags (k=2). The operator Δ is difference, which was used to reduce the effect of unit root for stationarity of time series data (Said & Dickey, 1984). Typically, the transformation of the first difference of natural logarithm was applied to represent percentage change of time series.

T-statistic and F-statistic tests were adopted to assess the entire parameter. The F-statistic test was adopted to verify the significance level of the jointly dynamic impact of trade openness and the macroeconomic determinants on manufacturing sector performance in Malaysia.

Baumohl and Lyocsa (2009) declare that non-stationary time series data lead to the problem of spurious regression in the model. Spurious regression will induce an extremely high value of R^2 and t-statistics. A rule of thumb to detect spurious regression is when R^2>DW statistic (Fukushige & Wago, 2002).

The model was validated and evaluated by conducting diagnostic tests to ensure that the estimations were robust and unbiased. The diagnostic tests were performed to check the model for normality, serial correlation, and heteroscedasticity. The results are reliable if the model passed all the diagnostic tests.

Annual data from 1981 to 2016 were used for estimations. A series of trade openness derived from the sum of exports and imports over GDP and manufacturing production index were collected from the Department of Statistics Malaysia, while a series of average lending rate and Malaysian exchange rate were collected from the *Monthly Statistical Bulletin Bank Negara Malaysia*. The dummy variable, *crisis*, refers to the existence of three main crises that obstructed the Malaysian economy (Athukorala, 2013).

Results

Unit Root Test

The notion of a stationary process is essential in time series analysis. The presence of a unit root or non-stationarity of time series could lead to spurious regression or misleading results (Baumohl & Lyocsa, 2009). Said and Dickey (1984) propose that for the case of unit root or non-stationary, the differencing of series could establish stationarity. The Augmented Dickey-Fuller (ADF) of Dickey and Fuller (1981) was adopted to detect whether the unit root or non-stationary occurs in the model. The approaches of ADF tests that include a constant and a constant and trend were employed. The stationarity result is presented in Table 1.

Table 1: Result of unit root test

Augmented Dickey-Fuller (ADF) Test				
Variable	Constant		Constant + Trend	
	Level	First Difference	Level	First Difference
lnMPI	-2.183**	-3.942***	0.613	-4.930***
	(0.0184)	(0.0002)	(0.9783)	(0.0003)
lnOPNS	-1.762**	-3.507***	-0.703	-4.584***
	(0.0440)	(0.0007)	(0.9729)	(0.0011)
lnMEXC	-1.122	-3.544***	-2.093	-3.468**
	(0.1353)	(0.0007)	(0.5499)	(0.0429)
lnALR	-0.839	-4.142 ***	-3.077	-4.084 ***

(0.2038)	(0.0001)	(0.1118)	(.0067)

Note: ***, ** and * denote rejection of the null hypothesis of unit root test at 1%, 5% and 10% significance level. The parentheses indicate the p-value of the ADF test.

Table 1 shows the result of the ADF test. The result shows that all the time series variables (*lnMPI, lnOPNS, lnMEXC, lnALR*) are non-stationary at the level form, but they are stationary after first difference, i.e., *lnMPI~I(1), lnOPNS~I(1), lnMEXC~I(1)* and *lnALR~I(1)*.

OLS estimations of distributed lag model

By establishing stationary of time series data, the problem of misleading result and spurious regression could be avoided (Baumohl & Lyocsa, 2009). The results of the impact of trade openness and other macroeconomic determinants on manufacturing sector performance in Malaysia are shown in this section.

Table 2: Regression result of distributed lag model

Regressor	Coefficient	p-value
ΔlnOPNS	0.3000	0.024**
ΔlnOPNS(-1)	0.2466	0.091*
ΔlnOPNS(-2)	0.2593	0.053*
ΔlnMEXC	0.1008	0.251
ΔlnMEXC(-1)	-0.1769	0.096*
ΔlnMEXC(-2)	-0.0443	0.701
ΔlnALR	0.0015	0.988
ΔlnALR(-1)	-0.0930	0.306
ΔlnALR(-2)	0.2733	0.003***
CRISIS	-0.1290	0.000***
Constant	0.0818	0.000***
R-Squared		0.8204
DW-statistic		1.9485
Diagnostic Tests		
A: Normality		CHSQ(2) = 1.22 [0.5447]
B: Heteroscedasticity		CHSQ(1) = 0.25 [0.6180]
C: Serial Correlation		CHSQ(1) = 0.275 [0.6001]

Note: ***, ** and * denote 1%, 5% and 10% significance level. The parentheses of the variables indicate lag period of the variable, i.e., -1 represents one lag period, -2 represents two lags period.
A: Based on test of skewness and kurtosis of residuals
B: Based on Breusch-Pagan test for heteroscedasticity
C: Based on Breusch-Godfrey LM test for serial correlation

Table 3: Result of F-statistics test for jointly dynamic effect of control variables

	$\sum_{i=0}^{k} \Delta lnOPNS_{t-i}$	$\sum_{i=0}^{k} \Delta lnMEXR_{t-i}$	$\sum_{i=0}^{k} \Delta lnALR_{t-i}$
Length of lag	2	2	2
Long run propensity (%)	0.8060	-0.1203	0.1818
F-statistic	8.07	1.54	3.87
p-value	0.0008***	0.2317	0.0230**

Note: ***, ** and * denote 1%, 5% and 10% significance level.

The value of R-square is 82.04%, implying that 82.04% variation of trade openness and macroeconomic determinants can explain the variation of manufacturing production growth in Malaysia by incorporating the event of economic crisis. The model does not have the problem of spurious regression, as the R^2<DW statistic is (0.8204<1.9485). For the stationary of time series data, the test-statistics are reliable. The estimations are robust as the results were validated by diagnostic tests.

The findings demonstrate that the percentage change in trade openness has an instantaneous and jointly dynamic effect that is positive and statistically significant on manufacturing production growth in Malaysia. The percentage change in the Malaysian exchange rate has a positive and insignificant instantaneous effect on manufacturing production growth, but the jointly dynamic effect is adverse and insignificant. The instantaneous and jointly dynamic effects of the percentage change in average lending rate are positive and insignificant[1]. The insignificant effect of macroeconomic determinants implies that the complementary macroeconomic policy plays a less important role to enhance manufacturing production in Malaysia. Last but not least, economic crisis has a negative and significant impact on manufacturing production growth in Malaysia.

Discussion of the results

Trade openness plays a significant role to enhance the manufacturing sector production growth in developing countries. The decision of policymakers to implement trade policy, whether to adopt an import substitution or export promotion policy, is important to boost the growth of the manufacturing sector in Malaysia.

The empirical results show a significant positive relationship between the percentage change in trade openness and manufacturing production growth in Malaysia. The relationship is in line with Chandran and Munusamy (2009) for the case of Malaysia, Adamu (2014) for the case of Nigeria, and Dutta and Ahmed (2004) for the case of Pakistan. The result suggests that opening to trade by the removal or reduction of trade barriers can promote the growth of the manufacturing sector in Malaysia. As the economy is more opening and liberalizing, more trade is encouraged, which in turn, enhances the productivity growth of the manufacturing sector.

Besides that, the instantaneous effect of the percentage change in the exchange rate on manufacturing production growth is positive but insignificant. However, the dynamic effect is negative and insignificant. The result implies that there is no significant relationship between the Malaysian exchange rate and manufacturing production growth. The finding aligns with the result of Adamu (2014) but is contrary to the study of Umoh and Effiong (2013). The positive instantaneous effect might be due to the higher cost of import inputs that can be covered and afforded when the exchange rate is depreciated. However, in the short-term, lower growth of export goods and higher costs of import inputs will suppress the production growth of the manufacturing sector.

Moreover, the instantaneous effect and the jointly dynamic effect of the percentage change in average lending rate on manufacturing production growth are positive and insignificant. The finding contradicts Umoh and Effiong (2013) study, who used interest rate spread in the study.

[1] Further check for the jointly dynamic effect of $\Delta lnALR$ was performed by letting $\theta = \sum_{i=0}^{k} \beta_{3i}$ to find the overall impact of $\Delta lnALR$ with its lags. The result indicates that the coefficient, $\theta = 0.1818$, t-ratio=1.29, and the corresponding p-value=0.211. Thus, $\Delta lnALR$ has an insignificant jointly dynamic impact.

The reason is simple and straightforward. During the period of favourable investment, the return is higher that can cover lending costs, although the average lending rate is high. Therefore, the period of favourable investment promotes technological changes and manufacturing production growth in Malaysia.

Lastly, the impact of economic crisis is negative and significant on Malaysian manufacturing production growth. The relationship aligns with the study of Wong (2009). Economic crises induce risks for the manufacturing industry. Hence, trade openness and the macroeconomic determinants will lower manufacturing production growth during an uncertain time. That is, the manufacturing production growth is hindered by economic crises.

Conclusion and policy implications

This study investigates the impact of trade openness, macroeconomic variables (i.e., Malaysian exchange rate and average lending rate), and the event of the economic crisis on manufacturing sector performance in Malaysia using the annual data from 1981 to 2016. A distributed lag model was used to examine the instantaneous and jointly dynamic effect among the variables. Diagnostic tests validated the robustness of the estimations.

The findings demonstrate a positive and significant relationship between the percentage change in trade openness and manufacturing production growth in Malaysia, but the economic crisis has a negative and significant impact on manufacturing sector performance. The insignificant impact of macroeconomic variables implies the less crucial role of macroeconomic policy in enhancing manufacturing productivity growth in Malaysia. The findings also suggest that openness to trade is important to promote and stimulate the productivity growth of the manufacturing sector regardless of economic crises.

For policy implications, the direction of the Malaysian trade policy should be designed based on outward-looking strategies. When formulating a trade policy, policymakers need to make a sector-specific analysis to understand the mechanism and impact of trade openness on output growth. The policymakers can review disaggregated analysis based on industrial level, manufacturing level, and firm level when performing the sector-specific analysis. By implementing an outward-oriented policy, Malaysia can take advantage of X-efficiency, economies of scale, increased competition, and technological catch-up in the industrial and manufacturing sector. Therefore, an outward-oriented policy is an engine to boost manufacturing production growth.

Besides that, the Malaysian government should diversify the imports and exports of the nation. The purpose of diversifying trade is to reduce the impact of economic crisis and the dependency of trading partners. Trade can be diversified in terms of products and trading partners. The degree of import dependency in terms of raw materials, intermediate goods, and final goods from the same trading partner should be reduced to protect the domestic manufacturing sector from economic shocks. Malaysia should also strengthen the export-oriented sector to diversify the export of capital goods and final products. Thus, the diversification of trade could enhance the production growth of the Malaysian manufacturing sector.

Moreover, it is recommended that Malaysia foster trade integration. Trade integration is important for economic globalization and integration into the world economy. Trade integration can be done by signing bilateral trade contracts and bilateral or regional free trade contracts with regional economic partners and other countries. The enhanced trade integration will improve Malaysian trade activities and economic growth, which, in turn, encourage

technology transfer and the inflow of foreign direct investment. Therefore, Malaysia should focus on trade integration to strengthen the domestic manufacturing sector. As a whole, the policy will enhance and boost the productivity growth of the manufacturing sector in Malaysia.

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