# Trade Elasticities and the Marshall Lerner Condition: Evidence from Sri Lanka

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**Abstract**

Sri Lanka is the pioneer in adopting market-friendly policies in South Asia and has gone through different foreign exchange rate regimes since 1977. Since then, the country has experienced rapid fluctuations in the trade balance and the exchange rate. The empirical studies on Marshall Lerner condition have suggested mixed results in the global context. However, this paper aims to estimate the import and export price elasticity to determine the validity of the Marshall Lerner condition in the Sri Lankan context. For this purpose, annual time series data for the period from 1980 to 2018 were used in estimating the elasticities. The results suggest that the addition of overall export price elasticity and overall import price elasticity as a ratio of export expenditure over import expenditure is less than one, which indicates that the trade balance of Sri Lanka deteriorates when the domestic currency depreciates against foreign currency. Hence, the findings of the study revealed that the Marshall Lerner condition is satisfied in the Sri Lankan context.

**Keywords:** *Exchange rate; trade balance; trade elasticities; Marshall Lerner condition*

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## 01. Introduction

Sri Lanka is an island located in the heart of the Indian Ocean and blessed with its unique geographical location and natural resources. According to the Central Bank of Sri Lanka, the country has a 21.8 million population, USD 3,852 per capita income, and a 2.3% annual economic growth rate in 2019 (Central Bank of Sri Lanka, 2020). Sri Lanka's external sector continued to be under pressure over the last decades with less than expected foreign exchange inflows to the current account, increased capital outflows, and inadequate foreign investments, which resulted in widening the trade deficit. Figure 1 illustrates that Sri Lanka's exports earnings and imports expenditure has increased since 1990's.

**Figure 1: Imports, Exports, and Trade Balance of Sri Lanka (1980-2018)**
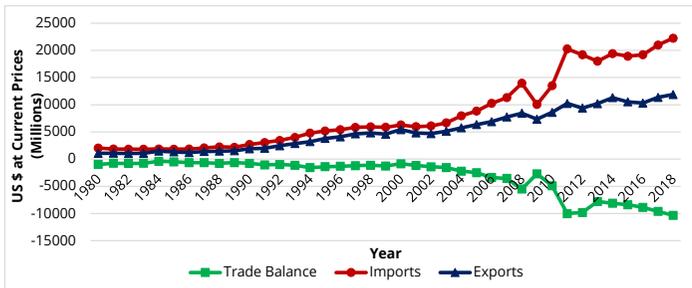


*Source: United Nations Conference on Trade and Development (2020)*

As shown in Figure 1 expenditure on imports was rising faster than earnings from exports mainly due to importation of essential consumer goods, heavy dependence upon imported intermediary goods such as refined petroleum, crude oil, textiles and textile articles (Central Bank of Sri Lanka, 2020). This has led to a deficit in the trade account of the balance of payment and the deficit is continuously increasing since 1990s' to date. Growing current account deficits are usually a precursor to balance of payments difficulties which may create negative economic impacts for the economy (United Nations Conference on Trade and Development, 2020). With the effect of the independent floating exchange rate regime in 2001, the exchange rate of Sri Lanka was fluctuated and depreciated rapidly. The behaviour of the annual exchange rate of LKR to USD is graphically shown in Figure 2.

**Figure 2: Official exchange rate (annual average) (2000-2018)**
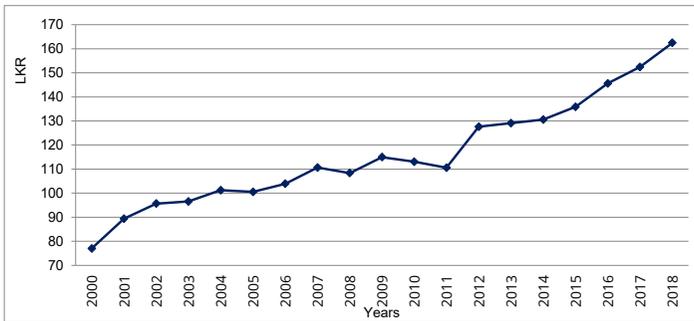


*Source: World Development Indicators, World Bank (2019)*

The implementation of an independent floating exchange rate regime followed a massive depreciation in LKR till the end of 2002 by 24% compared to the year 2000 (World Development Indicators, 2019). From 2002 to 2009 the exchange rate was continued to depreciate and afterwards, it has seen an appreciation of domestic currency against the USD following the world financial crisis in 2009. This currency appreciation was a result of capital inflows that happened mostly through the capital market and Sri Lankan bond market with the fading of uncertainties during the civil war. But this appreciation of domestic currency did not last for a longer period since the exchange rate peaked from Rs.110.56 in 2011 to Rs.162.46 of the annual average exchange rate in 2018. However, by the end of 2018 December, the exchange rate was reported as 182.75 LKR per dollar (Annual Report, various issues). As shown in Figure 2, in 2018 Sri Lankan rupee has depreciated by 10% (nominal terms) with respect to the USD while the same was only 2% in 2017. The currency depreciation was primarily caused by massive capital outflow which took place mainly with the interest rate hike given by the Federal Reserve System which resulted in withdrawing investments from Sri Lankan Treasury bills and bonds. Further, it is noticed that, by the end of 2018, the net balance in the foreign direct investment account was 1.5 USD billion (Central Bank of Sri Lanka, 2020). A massive capital outflow during this period was backed by the upswing in international oil prices and the importation of motor vehicles (Weerakoon, 2018).

The theoretical underpinnings indicate that the depreciation of the

home currency against foreign currency does not necessarily bring negative impacts to the home country. It will bring both favourable and unfavourable results to the home country (Ariccia, 1998). Depreciation of the domestic currency will increase the prices of imports, the outstanding stock of foreign debt, and foreign debt service payments. Nevertheless, deprecation of the domestic currency can increase the demand for exports of the home country and decrease the imports to the home country (Ariccia, 1998). This leads to increase consumption of domestically produced goods and increase domestic production. However, the combined effect of imports and exports on the Balance of Payment (BOP) will eventually decide the results of currency depreciation (Central Bank of Sri Lanka, 2016). Figure 1 depicts the annual trade balance of Sri Lanka from 1948 to 2018 and it is noticed that the trade balance has recorded a continuous deficit and the deficit has increased over the time period.

Appleyard and Field (1986 & 2014), and Salvatore (2013) noted that the ultimate impact of currency depreciation on the trade account is determined by both import price elasticity and export price elasticity. If the price elasticity of imports is elastic, it will lead to improving the trade account balance as a result of the reduction of home country imports drastically with the increasing prices of imports due to currency depreciation. If the price elasticity of exports is elastic, the demand for exports by the rest of the world will increase due to lower prices of domestic goods following currency depreciation. This leads to an increase in net exports and improves the trade balance.  Hence it is seen that the combined effect of import price elasticity and export price elasticity will determine the exact impact on the trade balance.

The above scenario can be explained using Marshall Lerner condition which suggests that if the addition of price elasticity of demand for imports and the price elasticity of demand for home country exports is greater than one, the trade account balance will improve with the depreciation of the domestic currency, in the case of existence of initial balanced trade (Appleyard & Field, 2014; Salvatore, 2013). Moreover, In the event of possessing an initial unbalanced trade, the sum of price elasticity of demand for imports and the price elasticity of demand for home country exports as a ratio of total expenditure on exports and imports is greater

than one, trade account balance will improve following a depreciation of the domestic currency against foreign currency. Further, it is important to note that the price elasticity of supply of exports is kept out of the concern assuming it is perfectly elastic (Appleyard & Field, 2014; Salvatore, 2013). The relationship between trade account balance and the exchange rate between LKR and USD during the period of 1980 to 2018 is illustrated in Figure 4.

**Figure 3: Trade balance and exchange rate (1980- 2018)**
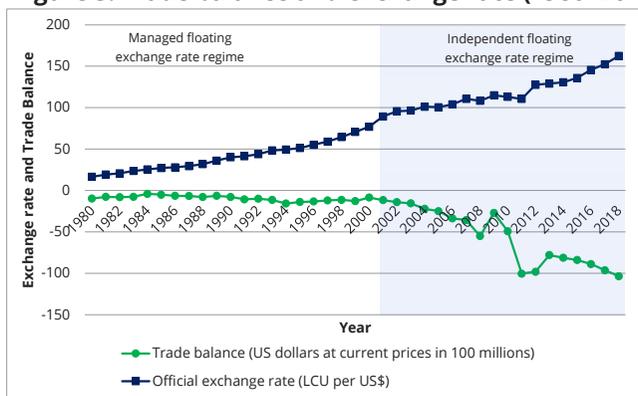


*Source: World Bank and United Nations Conference on Trade and Development (2020)*

Although the Marshall Lerner condition suggests that the trade balance should improve following a depreciation of the home currency against foreign currency, this relationship cannot be observed in the Sri Lankan context (Figure 3). Though the LKR has depreciated against the USD, the trade balance in Sri Lanka has worsened during the period, which appears to be contradictory to the Marshall Lerner condition. Hence, this study aims to test the applicability of the Marshall Lerner condition to Sri Lanka by using the data from 1980 to 2018. In addition, the study estimates the import price elasticity of intermediary imports which accounted for 56.2 percent of the total imports in 2018 (Central Bank of Sri Lanka, 2020). Furthermore, export elasticities of major export destinations were investigated in detail as it is useful in formulating the exchange rate and trade policies in Sri Lanka.

## 02. Empirical Review and Theoretical Considerations
### 2.1 Theoretical Framework

According to Begum and Alhelal (2016), the exchange rate is an important variable that affects several sectors in the economy such as exports,

imports, capital flows, inflation, and foreign exchange reserves. It has been identified that in small open economies, the import and export elasticities indicate whether currency depreciation has a favourable effect on the trade flows of that country. Thus, the responsiveness of trade flows to relative price changes has been identified as a major concern by policymakers when designing exchange rate policies.

The theoretical consideration established under the Marshall Lerner condition was founded by a well-known couple of economists; Alfred Marshall and Abba P. Lerner (Appleyard & Field, 1986). Later this concept was extended within Marshallian Partial Equilibrium framework by Robinson in 1937 and developed Marshall Lerner condition (Metzler, 1949). Marshall Lerner analysis attempts to identify the setups required for a currency devaluation and currency depreciation which effectively enhance the trade balance of the country. The analysis considers the initial position of the trade balance, whether it is balanced or unbalanced. The estimated trade elasticities will be used to check the Marshall Lerner condition using the following equation (Appleyard & Field, 2014).

**Figure 4: Marshall Lerner Condition**
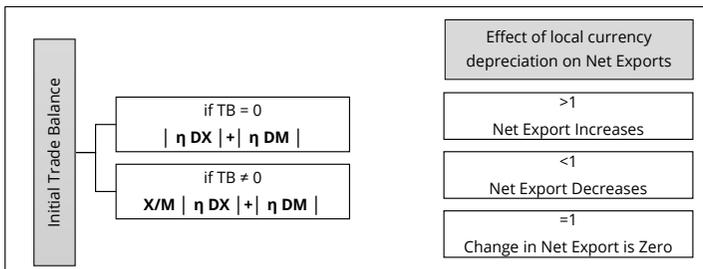


Source: Appleyard and Field (2014)

where,

TB= Trade Balance

X = expenditures on exports

M = expenditures on imports

η DX = price elasticity for home exports

η DM = price elasticity for imports

If the initial trade balance is balanced, the addition of import price elasticity and export price elasticity in absolute terms must be greater

than one, currency depreciation will improve the trade account balance. If the figure is less than one, the trade balance will decrease and if the figure equals one, net export will not change. However, if the initial trade balance is not in equilibrium, the addition of import price elasticity and export price elasticity as a ratio of total imports and total exports is considered in determining the Marshall Lerner condition. If this value is greater than one, net exports will increase when the domestic currency depreciates against foreign currency and vice versa. Moreover, when this value is equal to one, net exports will remain unchanged (Kulkarni, 1996). It is important to note that to satisfy the Marshall Lerner condition, the price elasticity of supply for exports is assumed to be perfectly elastic. More precisely, it is assumed that the domestic suppliers are capable to meet the demand that arises from the foreign buyers (Appleyard & Field, 2014).

However, Kulkarni (1996) expressed that the effect of currency depreciation on the trade balance depends upon the time period. Accordingly, Marshall Lerner condition is less likely to be held in the short run as smaller elasticities prevail in the short run. Thus, in the short run, currency depreciation can lead to a balance of trade (BOT) deficit which is called the "Perverse Reaction" of BOT to the exchange rate movements. However, in the long run, Marshall Lerner condition holds as the values of elasticities increase and thereby depreciation of currency leads to BOT surplus. Given that, BOT behaves as explained in the J curve effect in the short and the long run (Appleyard & Field, 2014).

Moreover, the literature describes three main approaches in explaining the impact of currency depreciation on the behaviour of the trade balance, namely; the elasticity approach, absorption approach, and income approach (Anwar & Majeed, 2019). The absorption approach describes that a nations balance of trade position is depend on the country's output and its absorption-total domestic spending. Accordingly, the depreciation of a local currency will improve the balance of trade only if the domestic output exceeds its spending. However, the theory is incapable of explaining the inflationary impact, impact of capital movement and it assumes that the economy is below full employment level always (Anwar & Majeed, 2019). The income approach or the monetarist approach is

developed in late 1950s, discussing the impact of the monetary factor on trade. Accordingly, trade balance depends on the demand and supply of money in the economy. When the money demand exceeds the money supply in an economy, it has to bring the money from abroad to meet the excess demand. Thereby, this inflow of money improves the trade balance. Similarly, excess supply of money to the market causes money outflow from the economy thus worsening the balance of trade (Anwar & Majeed, 2019). The elasticity approach explains the effect of exchange rate appreciation or depreciation on determining the balance of trade (Anwar & Majeed, 2019).

## 2.2 Empirical Review

There exist numerous empirical studies on the impact of exchange rates on BOP with varied results. Some studies have found a contractionary effect of the depreciation of exchange rate on the BOP position (Kulkarni, 1996; Mahmud et al., 2004; Panda & Reddy, 2016; Shahzad et al., 2017), while others find expansionary effects of exchange rate depreciation on BOP position (Mohammad & Hussain, 2010; Caporale et al., 2012; Eita, 2013; Pandey, 2013; Bano et al., 2014; Lucy et al., 2015; Begum and Alhelal, 2016; Gunes, 2016).

A study undertaken by Pandey (2013) confirmed the validity of the Marshall Lerner condition for India by using annual time series data from 1993 to 2011. However, Panda & Reddy (2016) investigate the empirical validation of Marshall Lerner condition and the J-curve hypothesis in relation to India and China using annual data from 1987 to 2014 for domestic income, foreign income, trade balance and exchange rate. To estimate the long run and short-run relationship between the selected variables it uses Auto-Regressive Distributed Lag (ARDL) and Error Correction Model tests. The results of the study rejected the Marshall Lerner condition and the J-curve phenomena which concludes that the rupee depreciation would not improve the trade balance of Sri Lanka between India and China.

Bano et al. (2014) tested the Marshall Lerner condition for Pakistan from 1980 to 2010 by employing a cointegration approach and confirmed the possibility of improving trade balance through currency devaluation. The findings of this study were confirmed by Mohammad & Hussain

(2010) who investigate the relationship between the devaluation of the real exchange rate and trade balance in Pakistan using data from 1970 to 2008. According to the findings of Johansen-Juselius cointegration technique and impulse response function, it clears that the Marshall Lerner condition holds in the context of Pakistan. However, Iqbal et al. (2015) tested the Marshall Lerner condition for Pakistan using data from 1980 to 2013 against ten of its major trading partners and found that the condition validates only for six countries namely; US, UK, Saudi Arabia, Canada, and France while it does not apply to Japan, Germany, UAE, and Kuwait.

Begum and Alhelal (2016) in their study tested Marshall Lerner condition for Bangladesh from 1985 to 2014 using the Johansen and Juselius Cointegration analysis. The results confirmed the long-run validity of Marshall - Lerner condition for Bangladesh. A similar study conducted by Murad (2012) for Bangladesh found a contradictory result. The study tested the bilateral Marshall Lerner condition for Bangladesh against its major trading papers for the period 1973 to 2009. The findings confirm that the Marshall Lerner condition holds only for the US while the condition does not hold for other trading partners. In addition, Khatoon and Rahman (2009) find out that the currency devaluation has a positive impact on the trade balance in the short run and long run in Bangladesh. However, the findings do not support the theoretical underpinnings of J-curve behaviour for Bangladesh.

Gunes (2016) investigated the applicability of the Marshall Lerner condition for Turkey with its most important bilateral trading partners such as Germany from January 2010 to December 2014 using ARDL and cointegration analysis. The results confirm that the Marshall Lerner condition will apply to Turkey. Caporale et al. (2012) tested the Marshall Lerner condition for Kenya by employing fractional integration and cointegration techniques using quarterly data from 1996 to 2001. The results indicate that the Marshall Lerner condition is satisfied for Kenya in the long run.

Shahzad et al. (2017) empirically tested the Marshall Lerner condition for South Asian countries; Bangladesh, Bhutan, India, Maldives, Nepal,

Pakistan and Sri Lanka, using a panel data analysis for the period of 1993 to 2010. Results suggested that the Marshall Lerner condition does not fulfill for the South Asian region. Kulkarni (1996) tested the Marshall Lerner condition and the J-curve effect in Egypt and Ghana. The study found that the continuous devaluation of the local currency has not resulted in improving the balance of payment. Mahmud et al. (2004) came up with a controversial argument in their study of testing Marshall Lerner condition using a non-parametric approach. Accordingly, the study found that the Marshall Lerner condition only holds during the fixed exchange rate regime period while it does not hold in the flexible exchange regime.

Effects of foreign currency fluctuations on the trade balance of a country further explain the J-curve. The trade balance will adjust with time lags in the short-run. Currency depreciation will further worsen the trade balance in short-run and will lead to improvements in the medium to long run (Appleyard & Field, 2014). Noland (1989) tests the J-curve behaviour in Japanese trade through a generalized gamma-distributed lag model. Results suggest that the lag period is considerably lengthy in responding to changes in the exchange rate.

Nevertheless, Marshal Lerner condition has not been tested focusing only on the Sri Lankan Context. Since the structure of trade is different in Sri Lanka when compared to other South Asian counterparts, a detailed analysis is needed to derive clear conclusions. Therefore, the present study attempts to fill this gap by testing the applicability of the Marshall Lerner condition for the Sri Lankan economy. Furthermore, the study disaggregates intermediary imports from total imports and exports to the top ten export destinations from total exports in determining the trade elasticities to test the Marshall Lerner condition for Sri Lanka, which can be highlighted as an important contribution to the existing body of literature.

## 03. Methodology
### 3.1 Data and Variables
The study has followed a quantitative research design in empirically investigating the results. Annual data from 1980 to 2018, obtained from the World Bank database and United Nations Conference on Trade and

Development (UNCTD) were used in the model development. The official exchange rate published by the Central Bank of Sri Lanka (LKR per USD, annual average) was used to capture the exchange rate implications. Annual merchandise imports in USD at current prices and annual merchandise exports USD at current prices were used as Imports and Exports of Sri Lanka respectively. Moreover, intermediate goods imports to Sri Lanka at USD were obtained from the World Bank database. In addition, the domestic income of Sri Lanka was captured by Gross National Income (GNI) current in USD and also the world income is taken by the GNI in current USD. The study uses current values of the measurement to capture the sensitivity of exports and imports to the exchange rate. The top 10 export destinations of Sri Lanka were extracted from the Annual Report of the Central Bank of Sri Lanka in 2019 and the value of total exports was indicated in USD. These values were taken at current prices to calculate the export price elasticity of demand. Also, the GNI of each country is retrieved from the World Bank database.

### 3.2 Model Specification

The study attempts to test the applicability of the Marshall Lerner condition for Sri Lanka for the period from 1980 to 2018. Hence, the model has been specified to capture the import and export price elasticity of demand. The model specification of the present study is based on the study undertaken by Pandey (2013). Income is used as a control variable in the model (Pandey, 2013). The error term is denoted by ε in equations. To calculate the import price elasticity and export price elasticity, a log-log model has been employed.

Price elasticity of demand for exports;
$\log (exports) = \beta o + \beta 1 \log (world\ income) + \beta 2 \log (exchange\ rate) + \varepsilon$ --------(1)
Price elasticity of demand for imports;
$\log (imports) = \pi o + \pi 1 \log (domestic\ income) + \pi 2 \log (exchange\ rate) + \varepsilon$ ---(2)

The price elasticity of demand for imported intermediary goods was separated from Equation 2 for an in-depth analysis on the import price elasticity.

Price elasticity of demand for intermediary goods;

*log (Intermediary goods) = πo + π1 log (domestic income) + π2 log (exchange rate) + ε ------(3)*

Moreover, the price elasticity of demand for exports for each export destination is analysed by an alternative equation (Equation 4). The country is identified as j; from 1 to 10.

Price elasticity of demand for exports of each country;
*log (exports $_j$) = βo + β1 log (country income $_j$) + β2 log (exchange rate) + ε ------------(4)*

The estimated trade elasticities were used to examine the applicability of Marshall Lerner condition as indicated from Equation 05 where Sri Lanka represented an unbalanced trade balance (Appleyard & Field, 2014; Salvatore, 2013). X/M was calculated as the average of export expenditure divided by import expenditure for the period of 1980-2018.

X / M | η DX |+| η DM |--------------------------------------------------------------------(5)

## 04. Analysis and Discussion

The descriptive statistics of the key variables used in the analysis namely; official exchange rate, annual merchandise imports, annual merchandise exports, intermediate imports, GNI of Sri Lanka, and world GNI are presented in Table 1.

**Table 1: Descriptive Statistics of the Variables**

| Variable | Observation | Mean | Std. dev | Minimum | Maximum |
|---|---|---|---|---|---|
| Year | 39 | 1999 | 11.40175 | 1980 | 2018 |
| Exchange rate | 39 | 76.587 | 43.384 | 16.53 | 162.46 |
| GNI of SL (in million USD) | 39 | 28191.26 | 27460.29 | 4067.15 | 86489.46 |
| World GNI (in million USD) | 39 | 40495102 | 24166472 | 11185854 | 85998323 |
| Imports (in million USD) | 39 | 8331.343 | 6707.398 | 1819.68 | 22232.8 |
| Exports (in million USD) | 39 | 5216.779 | 3545.856 | 1030.53 | 11889.6 |
| Intermediate imports (in million USD) | 29 | 4277.312 | 2644.409 | 1230.27 | 12488 |

*Source: Compiled by authors*

The results of the study are presented in Table 2 and Table 3. According to Table 2, the overall suitability of equations 01, 02 and 03 are significant at 1% level of significance. The explanatory power of equation 01, equation 02 and equation 03 is 97.5%, 97.9% and 96.2% respectively. The coefficient of the Log the exchange rate indicates the price elasticity of import and export, and it is significant in equations 01 and 02 at 1% whereas the same is significant in equation 03 at 10%. According to the estimated results, the price elasticity of demand for exports is 0.581, the price elasticity of demand for imports is 0.315 and the price elasticity of demand for intermediate import is 0.276 which indicate that all the calculated price elasticities are inelastic as the estimated values are less than one. These calculated values of price elasticities were used in examining the applicability of the Marshall Lerner Condition in the Sri Lankan context.

### Table 2: Results of Equation 01, Equation 02 and Equation 03

| VARIABLES | Equation 01 Merchandise Exports | Equation 02 Merchandise Imports | Equation 03 Intermediate Imports |
|---|---|---|---|
| Log exchange rate | **0.581*** | **0.315*** | **0.276*** |
|  | (3.781) | (3.219) | (2.022) |
| Log GNI world | 0.652*** | - | - |
|  | (4.157) |  |  |
| Log GNI Sri Lanka | - | 0.666*** | 0.584*** |
|  |  | (9.948) | (8.030) |
| Constant | -14.43*** | -8.348*** | -0.144 |
|  | (-3.386) | (-6.930) | (-0.120) |
|  |  |  |  |
| Observations | 39 | 39 | 29 |
| R-squared | 0.975 | 0.979 | 0.962 |

*Note: t-statistics in parentheses and \*\*\* p<0.01, \*\* p<0.05, \* p<0.1*

The estimated results in Table 02 indicate that the income elasticity of exports is 0.652, which reveals that the demand for exports in Sri Lanka is less sensitive to changes in world income. This shows that Sri Lankan exports can be considered as necessary goods. Moreover, the income elasticity of imports of Sri Lanka is 0.666 whereas the income elasticity of intermediate imports is 0.584. Accordingly, the income elasticity of imports and intermediate goods are highly inelastic and both of them are

insensitive to change income.

Table 3 displays the estimated results of equation 04 which specify the export elasticities of the top ten export destinations. Accordingly, equations 04.a to 04.j are significant at 1% level of significance. The explanatory power of equation 04.a to equation 04.j is in between 60% to 95%. The Log of the exchange rate which measures the price elasticity of export of each export destination is significant in equations 04.d, 04.e, 04.g, and 04.i at 1% whereas it is significant in equation 04.c at 10%. The price elasticity of demand for exports is elastic in India (2.680), Turkey (2.405) and the United Kingdom (1.202) whereas the price elasticity of demand for exports is inelastic in Italy (0.922) and Germany (0.193).

**Table 3: Results of Equation 04**

| VARIABLES | 04.a Belgium | 04.b China | 04.c Germany | 04.d India | 04.e Italy | 04.f Singapore | 04.g Turkey | 04.h United Arab Emirates | 04.i United Kingdom | 04.j United States of America |
|---|---|---|---|---|---|---|---|---|---|---|
| Log Exchange Rate | -0.190 | -1.169 | 0.193* | 2.680*** | 0.922*** | -0.696 | 2.405*** | -0.0749 | 1.202*** | 1.067 |
|  | (-0.425) | (-1.619) | (1.723) | (5.223) | (4.526) | (-1.370) | (5.859) | (-0.188) | (3.866) | (1.659) |
| Log GNI | 1.465*** | 1.773*** | 1.227*** | 0.439 | 2.473*** | 1.022*** | 0.323 | 0.713*** | 0.601 | -0.0129 |
|  | (4.715) | (7.083) | (7.460) | (1.589) | (8.249) | (3.276) | (1.357) | (4.995) | (1.653) | (-0.0185) |
| Constant | -25.69*** | - | -23.41*** | -12.03** | -61.63*** | -11.70* | -8.536* | -6.127** | -9.111 | 9.927 |
|  |  | 35.23*** |  |  |  |  |  |  |  |  |
|  | (-3.857) | (-8.452) | (-5.443) | (-2.176) | (-7.990) | (-1.976) | (-1.799) | (-2.692) | (-1.012) | (0.548) |
| R-squared | 0.794 | 0.940 | 0.927 | 0.938 | 0.953 | 0.603 | 0.936 | 0.872 | 0.926 | 0.853 |

Note: *Note: t-statistics in parentheses and* \*\*\* $p<0.01$, \*\* $p<0.05$, \* $p<0.1$

The import and export price elasticities estimated in equation 01 and equation 02 were fed into equation 05 to test the validity of the Marshall Lerner condition in the Sri Lankan context. As mentioned before, X/M was calculated by taking the average of export expenditure divided by import expenditure for the period of 1980-2018 and the calculated results were fed into equation 05 to get the decision criteria.

X/M | η DX |+| η DM |------------------------------------------------------------------(5)

**Table 4: Testing Marshall Lerner condition for Sri Lanka**

| X/M | η DX | η DM | Decision criterion | Expected behaviours in Trade balance |
|------|------|------|--------------------|--------------------------------------|
| 0.6689 | 0.581 | 0.315 | **0.599** | Worsen the trade balance in Sri Lanka |

Accordingly, to validate the Marshall Lerner condition, the trade balance should improve due to currency depreciation if the decision criterion is greater than one. Further, if the decision criterion is less than one, the trade balance will worsen with currency depreciation. As the estimated value is 0.599 which is less than one, it suggests that the trade balance should worsen in Sri Lanka as a consequence of the depreciation of the Sri Lankan rupee against foreign currency. This relationship is evident from Figure 03, which illustrates the behaviour of the exchange rate and trade balance in Sri Lanka.  From the empirical analysis on trade elasticities, it is evident that the Marshall Lerner condition is satisfied for the Sri Lankan economy.

When analysing the elasticity of imported intermediary goods to Sri Lanka, it reveals that the Marshall Lerner condition is satisfied in the Sri Lanka context. The price elasticity of intermediary imports remains more inelastic at 0.276 (Table 2) compared to the price elasticity of total imports (0.315). This confirms the less sensitivity of intermediary goods to the changes in the exchange rate in Sri Lanka. This has been the main contributing factor of the study as the import basket of the country was dominated by intermediate goods which accounted for 57.0% in 2018 of total imports. Also, it is noted that 18.5% out of total imports consists of crude oil and refined petroleum (Central Bank of Sri Lanka, 2020).

Referring to the price elasticities of top export destinations, India, the United Kingdom, and Turkey represent elastic export price elasticity while the export price elasticity of Italy is also close to one. However, export price elasticity is less than one for Germany and this result is significant at a 10% significance level. However, this result is not significant for Belgium, China, Singapore, the United Arab Emirates and the United States of America.

Based on the above analysis it is clear that the Marshal Lerner condition is satisfied in the Sri Lankan context. The same finding has been observed by Kulkarni (1996), Pandey (2013), and Begum and Alhelal (2016). In contrast, Shahzad et al. (2017) reject the applicability of Marshall Lerner condition for South Asian countries including Sri Lanka. However, it has tested the Marshall Lerner condition using regional trade in South Asia. Though the Marshal Lerner condition applies to Sri Lanka, this behaviour is not advantageous to the country due to the prevalence of low values of total export and import elasticity. If Sri Lanka could achieve a higher value for export and import price elasticity, the country can gain due to currency depreciation which would, in turn, assist to improve the trade balance in the country.

### 05. Conclusion

The study aimed to identify the applicability of the Marshall Lerner condition to the Sri Lankan context by using the time-series data over 28 years from 1980-2018. Trade elasticities were estimated using the log-log model and these results were used to investigate the applicability of the Marshall Lerner condition for the Sri Lankan economy. Furthermore, to get an in-depth understanding of the Marshall Lerner condition, the import price elasticity of intermediary goods and the export price elasticity of the top ten export destinations of Sri Lanka were used in developing the model. The findings of the study reveal that the price elasticity of imports is comparatively inelastic than the export price elasticity. Additionally, the price elasticity of imported intermediary goods is more inelastic compared to the price elasticity of total imports. In terms of export destinations, only India, United Kingdom, and Turkey have a higher price elasticity of exports. Based on the estimated trade elasticities, it is evident that the Marshall Lerner condition is satisfied for the Sri Lankan economy. From

the findings, it can be concluded that the deterioration of trade balance is expected with a local currency depreciation in Sri Lanka as the decision criteria of Marshall Lerner condition is less than one.

From the analysis of the study, it can be recommended to implement strategic policies to make trade elasticities more elastic which would be beneficial in securing an improved trade balance with currency depreciation. The export basket of Sri Lanka is currently composed of relatively low-price sensitive goods such as tea, coconut, spices, rubber product, and petroleum products. However, having non-traditional items in the export basket can place a substantial role in the global value chain which would be beneficial to Sri Lanka. Further, initiating trade policies and entering into bilateral trade agreements with countries (India, the United Kingdom and Turkey) having high export price elasticities would generate benefits to Sri Lanka. Moreover, considering the import price elasticity which is less than one in Sri Lanka, it is recommended to manufacture substitutes for imported intermediary items domestically. This will discourage a great influx of imports into the country at a currency depreciation, which causes an improvement in the trade balance in Sri Lanka.

### References

Anwar, S., & Majeed, M.T. (2019). *Real exchange rate and trade balance in Pakistan: An ARDL Co-integration approach*. Working Paper.

Appleyard, D. R., & Field, A. J. (1986). A note on teaching the Marshall Lerner Condition. *The Journal of Economic Education, 17*(01), 52-56.

Appleyard, D. R., & Field, A. J. (2014). *International Economics (*8th Edition ed.). New York: McGraw Hill Education.

Ariccia, D. G. (1998). Exchange rate fluctuations and trade flows: evidence from the European Union. *International Monetary Fund*, Working Paper No. WP/98/107.

Bano, S.S., Raashid, M., & Rasool, S. A. (2014). Estimation of Marshall Lerner condition in the economy of Pakistan. *Journal of Asian Development Studies*, *3*(4).

Begum, L. A., & Alhelal, H. M. (2016). Revisiting the Marshall Lerner condition in the Bangladesh economy: a cointegration approach. Monetary Policy Department Bangladesh Bank.

Caporale, G. M., Gil-Alana, L., & Mudida, R. (2012). Testing Marshall Lerner condition in Kenya. *South African Journal of Economics.*

Central Bank of Sri Lanka (2020). *Annual Report 2019,* Colombo 01: Central Bank of Sri Lanka.

Central Bank of Sri Lanka (2016). *Information Series Note,* Colombo 01: Central Bank of Sri Lanka.

Eita, J. H. (2013). Estimation of the Marshall Lerner condition for Namibia. *International Business & Economics Research Journal, 12*(5), 511-518.

Gunes, S. (2016). Marshall Lerner condition analysis: Turkey case. *Economics, Management, and Financial Markets, 11*(1), 272–283.

Hussain, A., & Muhammad, S. D. (2010). The role of exchange rate on balance of trade: empirical from Pakistan. *European Journal of Social Sciences*, *14*(01) 150.

Iqbal, J., Nosheen, M., Rabbia, T., & Manan, S. (2015). Testing for Marshall Lerner condition: bilateral trade between Pakistan and its major trading partners. *Forman Journal of Economic Studies, 11*, 1-14.

Khatoon, R., & Rahman, M. M. (2009). Assessing the existence of the J-Curve effect in Bangladesh. *The Bangladesh Development Studies,* 16(June), 79-97.

Kulkarni, K. G. (1996). The J-curve hypothesis and currency devaluation: cases of Egypt and Ghana. *Journal of Applied Business Research*, 12(2), 1-8.

Lloyd A. M. (1949). Tariffs, the terms of trade, and the distribution of national income. *Journal of Political Economy*, *57*(1).

Lucy, A., Sunday, R. J., & Pacific, Y. K. T. (2015). Exchange rate and trade balance in Ghana- testing the validity of the Marshall Lerner condition. *International Journal of Development and Emerging Economics, 3*(2), 38-52.

Mahmud, S.F. (2004). Testing Marshall Lerner condition: a non- parametric approach. *Applied Economics Letters*, *11*, 231-236.

Murad, S. M. W., (2012). Bilateral export and import demand functions of Bangladesh: a cointegration approach. *Bangladesh Institute of Development Studies*, *35*(1) 43-60.

Noland, M. (1989). Japanese trade elasticities and the J-Curve. *The Review of Economics and Statistics, 71*(1), 175-179.

Panda, B., & Reddy, D. R. K. (2016). Dynamics of India-China trade relations: testing for the validity of Marshall Lerner condition and J-Curve hypothesis. *IUP Journal of Applied Economics*, *15*(1), 7-26.

Pandey, R. (2013). Trade elasticities and the Marshal Lerner condition for India. *Global Journal of Management and Business Studies, 3*(4), 423-428.

Salvatore, D. (2013). *International Economics.* New Jersey: Wiley.

Shahzad, A. A., Nafees, B., & Farid, N. (2017). Marshall Lerner condition for South Asia: a panel study analysis. *Pakistan Journal of Commerce and Social Sciences, 11*(2), 559-575.

United Nations Conference on Trade and Development (2020). Retrieved January 20, 2021. Available at: https://unctad.org/statistics

Weerakoon, D. (2018). *Sri Lanka's Depreciating Rupee: Avoiding a Money-Go-Round*. Talking Economics. Retrieved April 20, 2021. Available at:http://www.ips.lk/talkingeconomics/2018/10/16/sri-lankas-depreciating-rupee-avoiding-a-money-go-round/

World Development Indicators. (2019). The World Bank. Retrieved January 20, 2021. Available at: https://datatopics.worldbank.org/world-development-indicators/