# Featured Article: Muting the Dragon's Ringtone

A case for the transition of the Indian Electronics Industry from China to Vietnam

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**Abstract** The policy of Atma-nirbhar Bharat is aimed at making India a self-sufficient and self-generating economy. This self-reliance sentiment was bolstered by anti-China protests due to the Galwan valley standoff. In this context, many Indian nationalists have vouched for the boycott of "Made in China" products especially electronics since they form 50% of Chinese imports and so moving to Vietnam is appreciated as a viable option. In this context, this paper uses the tools of comparative data analytics and constitute a Vector Error Correction Model (VECM) to analyze the efficacy of substituting Chinese imports with those from Vietnam and make a case for making this substitution possible.
Index Terms: Atmarnirbhar Bharat, boycott China, electronics, VEC model

## Introduction

India, China, and Vietnam initiated economic reforms around the same time, and all have had a fair degree of success in making their respective economies more broad-based and integrated into the world economy. The following graph indicates the 'Openness Index' or trade to GDP ratio for these three nations.

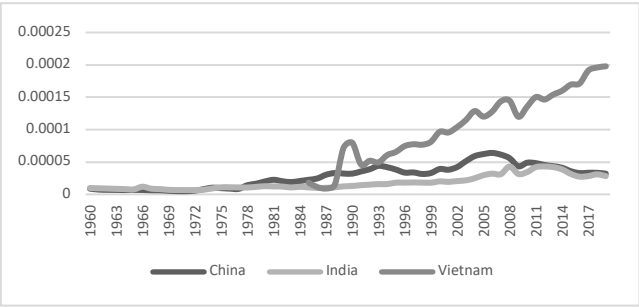



Fig 1: Trade Openness Index

From 1960 to 2008, there are continued instances of higher inclusiveness of trade in gross domestic product and relatively lower susceptibility to external shocks and volatility, ceteris paribus. The year 2009-10 has been identified as the year of structural break

which is an implication of the global financial crisis. The global economy was in a slowdown mode due to which the contribution of international trade in the GDP for each nation has fallen by a great amount. In the recent years, a majority of income for Vietnam comes from international trade whereas Indian and Chinese net exports contribute relatively less than consumption and investment to the national output.

The above diagram maps economic growth effects of trade whereas the following chart depicts the economic welfare effect of greater market integration by juxtaposing per capita income with the Balance of trade for each nation:

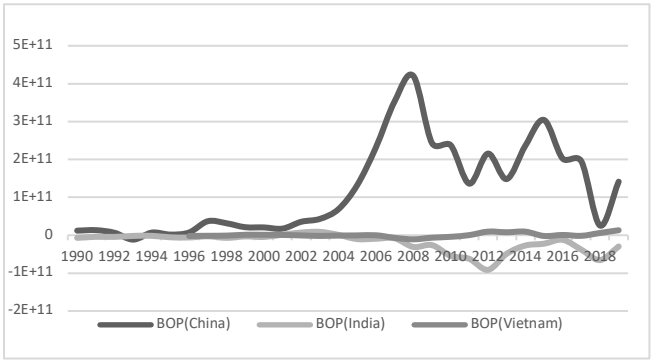



Fig 2: Balance of Payment of China, India, Vietnam

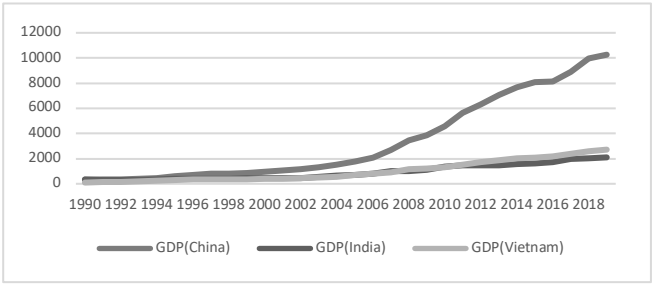



Fig 3: GDP per capita of India, China, Vietnam

The graphs highlight that all three countries per head income have continuously risen throughout the years, but Chinese growth has been exponential. On the other hand, Chinese BOP showcases a W-shaped trend, which reached its maximum in 2007-08 and minimum in 2018-19. Where China and Vietnam have witnessed a surplus on international trade, India has imported more than what it exports, and this trend was further accentuated after 2008. A clear picture emerges here. The country that has built its manufacturing capacity to sustain the domestic demands and satisfy global needs is the country that has seen an exponential rise in income per head. The country that depends on

foreign goods and services in the country with the lowest per capita GDP. Hence, it can be alleged that self-reliance through lower imports and greater exports will bring economic welfare for a nation.

The rate of import penetration can also measure such an advent of self-sufficiency. It is the ratio of import to domestic demand (GDP – net exports). The greater the extent of penetration, the lower the competitiveness of domestic suppliers and so poorer the scope of self-sufficiency.

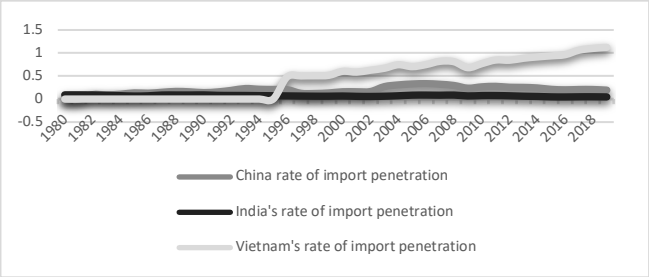



Fig 4: Rate of Import penetration

The above-stacked line chart highlights that China is the most self-sufficient, whereas Vietnam satisfies most of its domestic demand from imports. India is also endeavoring towards self-sufficiency as China is.

This idea of self-sustenance has recently found a new vigor in India. The coronavirus pandemic has proved to be a catalyst in rejuvenating the spirit of self-reliance and self-sufficiency in India. In this context, the Indian prime minister Mr. Narendra

Modi launched Atma-nirbhar Bharat's scheme on 12 May 2020 amidst the lockdown to make India a self-dependent and self-generating economy.

*"When the world is in crisis, we must pledge - a pledge which is bigger than the crisis itself. We must strive to make the 21st century India's century. And the path to do that is self-reliance," PM Narendra Modi said.*

To add to this idea, during COVID-19, global sentiments have accelerated against China. Galway issue further strained the 'Hindi Chini bhai bhai' relationship. Since India and China share integrated bilateral trade, one of the natural perceptions of this was banning the Chinese import. Of late, the national sentiment has hence polarized the whole idea of Atma-nirbhar Bharat as solely restricting imports from China.

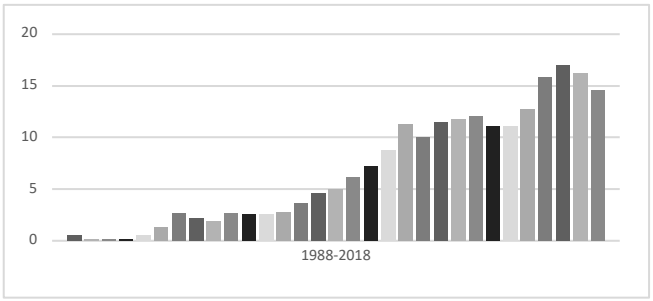
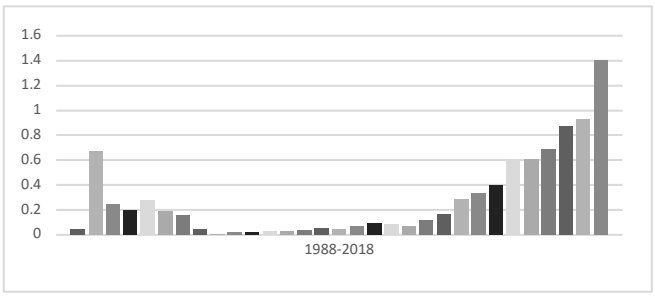



Fig 5: % of China's share in India's total imports

Taking a step back, we need to analyze our dependence on China more rationally:

From less than 1% in 1990 to more than 14% in 2018, the bar diagram shows that China has gradually increased its share in the total imports of India to become the second largest trading partner after the USA (The Economics Times 2020). On the contrary, India accounts for only 2.1% (Bureau 2018) of Chinese trade. Using simple maths, such a boycott will clearly hurt India more in the terms of both livelihoods and lives. Therefore, it's worthwhile to access the feasibility of such a 'wallet response' which comes in the form of boycott of 'Made in China' products.

Undoubtedly, in the short term, this move might appear to be highly idealistic and not practical. But in the long run, the same can become a reality if India either finds alternatives to China or develop domestic supply chains by increasing production, or both in conjunction. When we talk about diversifying imports, Vietnam seems to be one of the potential destinations. Low labour cost is one of the attractions for investment in Vietnam which is almost 50% lower than China (Statista 2020). Vietnam's biggest specializations are in production of electronics, textiles and furniture. However, Vietnam seems to lack the required expertise, competence, and capital-intensive machinery to take China's




position as of now. So, it's also worthwhile to examine Vietnamese dominance in India's overall imports.

Fig 6: % of China's share in India's total imports

India is now seeing Vietnam as a prospective import destination which is clearly highlighted by the bar diagram above. The exponential growth in import of Vietnam's goods and services is bound to be witnessed in future also. When compared with China, the dependence of India on Vietnam's commodities has been rising drastically whereas the same for Chinese products has become stagnant in the past 5 years. If this trend continues, India and Vietnam can witness greater economic integration in the coming 10 years.

Further dissecting the trade relations between India and China, the following graph speaks that forms a major chunk of total imports from China. The South Asian country import more than 50% of electronics from China as of 2018. Before 2000s, India, it was negligible but post 2000 trends signify an increasing dependence of Chinese electronics to satisfy domestic demand for the same.

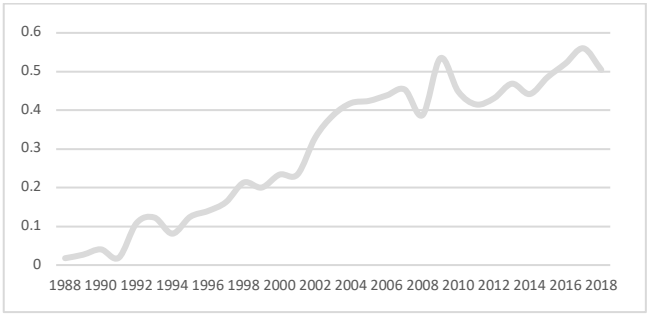



Fig 7: Share of electronics in total imports from China

Before jumping to conclusions, it's worthwhile to understand the performance of Indian electronics industry in relation with China and Vietnam.

*Indian electronics industry*

Over the years, rising digital penetration at the last mile in India has resulted in greater domestic demand for electronics. The country has struggled with ramping up the production on the same scale due to which it has to increase its dependence on imports for other nations, China being the front runner. The following graph shows the global standing of Indian industry relative to other nations:

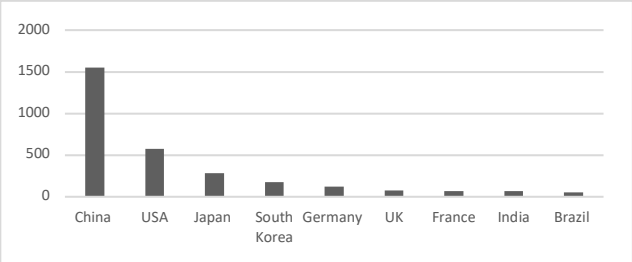



Fig 8: Market size of top electronics market (USD Billions)

As of 2020, India's electrical industry was valued at $70 billion (Gurnaney 2020) and accounts for 3.3% of the global electronics market (Srinivasa 2020). Continuing along the same path, the industry is expected to grow at around 30% (Statista, Statista 2020) for the next five years. This growth can be attributed to initiatives such as Make in India and availability of internet at reduced costs.

The economic scenario is leading the countries to shift the supply-chain from China. This opens up a hub of opportunities for the Indian electronics industry. To achieve and facilitate this growth, the industry needs remedy from high taxation, dearth of finance and power resources.

The table gives an overview of the total imports of electronics and chemicals and the respective share of China and Vietnam in these commodities for the past 10 years. Undoubtedly, China captures a majority of share in the import of both the commodities. As of 2018, India imported approximately 26% of its chemicals and 34% of electronics from China whereas the respective share of Vietnam is 0.7% and 3.4%.

| Years | Total import of Electronics | % imported from China | % imported from Vietnam |
|---|---|---|---|
| 2008 | 6E+07 | 18.95582 | 0.059097 |
| 2009 | 6E+07 | 28.11598 | 0.279362 |
| 2010 | 6E+07 | 29.00781 | 0.667052 |
| 2011 | 8E+07 | 30.00263 | 0.870502 |
| 2012 | 8E+07 | 29.5201 | 1.113719 |
| 2013 | 8E+07 | 31.87096 | 2.225545 |
| 2014 | 7E+07 | 34.38765 | 1.722952 |
| 2015 | 8E+07 | 37.23201 | 1.603207 |
| 2016 | 8E+07 | 38.29511 | 1.502165 |
| 2017 | 1E+08 | 41.26324 | 1.665131 |
| 2018 | 1E+08 | 33.90456 | 3.361423 |

TABLE I: Share of electronics imports

Now, it might also be rewarding to study the interplay of both Indian exports and imports. On visualizing the intra industry trade of India for electronics with respect of China and Vietnam using the Grubel Lloyd Index the following picture emerges:

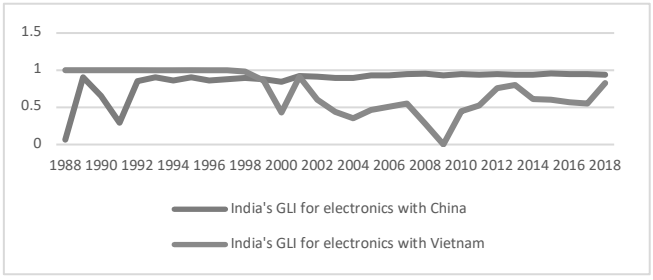



Fig 9: Grubel Lloyd Index Intra industry trade

$$GL_i = \frac{(x_i + M_i) - |x_i - M_i|}{x_i + M_i}$$

When $GL_i$=1, the country in consideration imports as much it exports to a given region. When $GL_i$=0, there is no intra industry trade and either the country in consideration is solely importing or exporting to a given region. First, let us consider China. The index

has been close to 1 over the year which implies that India imports from and exports to China, though the magnitude of imports is undoubtedly greater
than exports. Secondly, let's consider Vietnam. India majorly engages in both imports and exports for electronics ($GL_i = 0.8$).

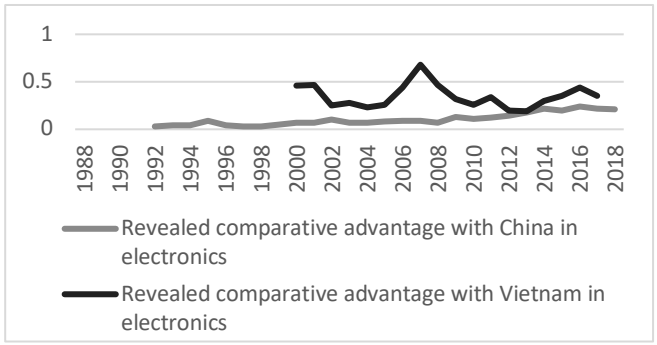



Fig 10: Revealed comparative advantage

After analyzing the status quo of intra industry trade, it might be valuable to look at the future potential and the relative long term advantage India enjoys between the electronics industry, for which the tool of revealed comparative advantage has been used:

This concept is based on the Ricardian comparative advantage concept, A value of less than one means than the country has a revealed comparative disadvantage. Here, India does not have has this potential for electronics clearly for both the countries. So, it might be difficult for India to walk the path of self-reliance and solely depending on its domestic manufacturing base and hence it would look for diversifying imports from countries like Vietnam.

## Literature Review

In the paper 'Vietnam-India Economic Ties: Challenges and Opportunities since 2007', Ngo Xuan Binh attempts to analyse the strategic partnership of India and Vietnam since 2007. Over the years, both the countries have developed strategic economic ties, however issues such as similar export-import structure, geographical distance, cultural difference, transportation difficulties make the task at hand more complicated (Binh 2016).

A paper by NITI Aayog, "Make in India Strategy for Electronic Products", weighs the two alternatives India has: export orientation strategy versus import substitution. The per capita income only doubled across a span of forty years when India practiced import

substitution. The growth since 1991 has enlarged the domestic electronics market in India, while at the same time, the global market remains relatively smaller. Thus, if we aim at the world markets, the scope for expansion is humungous. With China's share in the global trade of electronics declining, this is a one-time opportunity for India to capture the global market (Aayog 2016).

Dipika Sahu in her paper "Impact of Bilateral Trade between India and China on Economic Growth of India" concluded that imports from China contributed around 11.5% to the Indian GDP while total exports to China during this period of consideration contributed about 14% to the GDP (Sahu, Impact of bilateral trade between India and China on economic growth of India 2018).

In a paper by 'Pacific Business Review' it was found out that India is more important for China than China is for India. Also, China is a big threat to India in the case of dumping activities where India is force to impose duty on the imported product from China. The greatest issue is India's growing trade deficit with China. (Manav n.d.)

## Hypothesis

It will be difficult for India to resists its vulnerability to Chinese electronics imports in the short run. In the long run, dependence on Chinese imports can be reduced drastically and Vietnam can be seen as potential alternative.

## Methodology & Results

The data analysis in the present study uses secondary data for three variables: Gross Domestic Product per capita and Import of electronics from China and Vietnam for 31 years from 1988 to 2018 in India which was sourced from the World Integrated Trade Solutions (WITS) database. A classical multivariable linear regression model suffers from high degree of multicollinearity, autocorrelation and non-normality of error terms which leads to spurious regression results. The presence of such specious regression ensures the absence of the linear relationship between the time series variables GDPPC and Import of electronics from the given countries. Therefore, this study motivates to investigate the existence of both short term and long run association between the sample time series

variables adopting Johansen co integration and short run causality of import of electronics from China and Vietnam on GDP and GDP on Import of electronics employing Vector Error Correction Model (VECM) and appropriate coefficient diagnostic test called wald statistics. Before testing the cointegration and causality the sample time series data was involved for stationarity testing using the popular Augmented Dickey Fuller (ADF). To determine the optimal lag length, Akaike information criterion (AIC) has been used. Finally, the model is then checked for no autocorrelation, stability and normality of error terms. The entire data analysis has been performed STATA econometrics software in this study.

*Augmented Dickey Fuller Test*

This test is used to check whether a given time series is stationary over time or not. If a series is showing a trend (upward trend in our case), this means that the series is nonstationary. To check more formally, a general multivariable double log regression has been performed with following results:

TABLE II: Comparing R squared with Durbin Watson statistic

| Log (GDP per capita) | Coefficient | Standard errors | t-statistics | Prob. |
|---|---|---|---|---|
| Log (import of electronics from Vietnam) | .0214784 | .0288309 | 0.74 | 0.464 |
| Log (import of electronics from China) | .221629 | .0534371 | 4.15 | 0.000 |
| constant | 3.183076 | .5342062 | 5.96 | 0.000 |
| R-squared | 0.9469 | | | |
| Adjusted R-squared | 0.9421 | | | |
| F-statistic | 196.16 | | | |
| Prob. | 0.0000 | | | |
| D Watson statistic | .2386804 | | | |
| No. of observations | 25 | | | |

When R-squared > Durbin Watson statistic, as in this case, means that the outcome of regression is unstable and coefficients change sign on underfitting or overfitting and hence

the model is non stationary. It cannot be used for prediction and forecasting. So now the augmented dickey fuller test has been used to check for stability:

TABLE III: Results of Augmented Dickey Fuller test

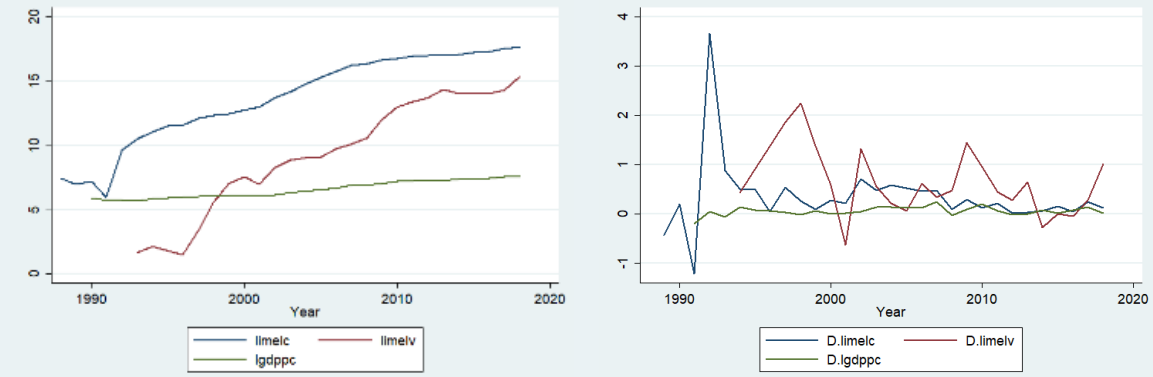
| **Levels** | | | | **First Difference** | | |
|---|---|---|---|---|---|---|
| *Variables* | *Test statistic* | *Critical Values* | | *Test statistic* | *Critical values* | |
| Log (GDP per capita) | 0.096 | 1%<br>5%<br>10% | -2.492<br>-1.711<br>-1.318 | -3.318 | 1%<br>5%<br>10% | -2.500<br>-1.714<br>-1.319 |
| Log (import of electronics from Vietnam) | -1.574 | 1%<br>5%<br>10% | -2.552<br>-1.734<br>-1.330 | -3.863 | 1%<br>5%<br>10% | -2.567<br>-1.740<br>-1.333 |
| Log (import of electronics from China) | -1.952 | 1%<br>5%<br>10% | -2.479<br>-1.706<br>-1.315 | -3.728 | 1%<br>5%<br>10% | -2.485<br>-1.708<br>-1.316 |

$H_0$: Variable is non stationary

In the normal log form, for each variable test statistic < critical values at 1%, 5% and 10% significance level. Hence, we cannot reject the null hypothesis.

On taking the first difference, for all the 3 variables, test statistic > respective critical values at the given level of significance, we reject null hypothesis. Now, the model is stationary at the first difference. Hence, first difference of these 3 variables will not be used for further analysis.

TABLE IV: Visual representation of stationarity




Non stationary Stationary

All the 3 variables are mostly rising showcasing a constant trend over the years. Especially, after the year 1995 it can be visualized from the line graph inserted here that the log of GDPPC and imports of electronics from Vietnam and China exhibits a rising trajectory. Taking the first difference of these variables make them stationary around 0.

*Johansen – Juselius Cointegration test*

Cointegration, an econometric property of time series variables, is a precondition for the existence of a long run econometric relationship between two or more variables having unit roots, integrated of order one. The Johansen approach shows that two or more random variables are cointegrated if each of the series is themselves non-stationary, and they have a long run equilibrium relationship among the variables. The precondition for applying Johansen Cointegration test is the variables must be non-stationary at level but when convert all the variables into first difference then they will become stationary. The multivariate cointegration model can be expressed as:

$$\Delta y_t = \alpha_0 + \pi y_{t-1} + \sum_{i \stackrel{\text{def}}{=} 1}^{p-1} r_i \Delta y_{t-i} + \varepsilon_t$$

where π and $r_i$ are coefficient matrices, p is the lag order based of AIC and $\Delta$ is the symbol of difference operator. Specifically, the maximum eigenvalue test and trace test

are used to test for the number of co-integrating vectors which can be computed respectively as:

$$T(r) = -T \sum_{i=r_{+1}}^{n} ln\left(1 - \hat{\lambda}_i\right)$$

$$\lambda\, max(r, r+1) = -T\, ln\left(1 - \hat{\lambda}_{r+1}\right)$$

where $\hat{\lambda}_i$ is the expected eigenvalue of the characteristic roots and T is the sample size.

$H_0$ (Trace test) = investigates the number of r cointegrating vectors against the alternative of n cointegrating vectors.
$H_0$ (Maximum Eigenvalue test) = investigates the number of r cointegrating vectors against the alternative of r+1 cointegrating vectors.

The results are as follows:

TABLE V: Results of Johansen cointegration test

| Cointegrating regressors | $H_0$ | $H_1$ | Trace statistics | Critical value at 5% | Max-L | Critical value at 5% |
|---|---|---|---|---|---|---|
| Log of GDP per capita = f(log of imports from Vietnam and China) | r = 0 | r = 1 | 61.7619 | 29.86 | 47.5282 | 20.97 |
| | r ≤ 1 | r = 2 | 14.2337 | 15.41 | 9.8705 | 14.07 |
| | r ≤ 2 | r = 3 | 4.3632 | 3.71 | 4.3632 | 3.76 |

$H_0$ = There is no cointegration (r = 0)
$H_1$ = There is cointegration among variables

Here 'r' means rank and if it is equal to 0 then the null hypothesis stands. Since the critical value is lesser than both trace statistic and Max-L statistics at r = 0, we reject the null hypothesis. At rank 0 there does exist cointegration. It is at rank 1, where both trace statistics and Max-L statistics are lower than the critical value at the 5% significance

level, which means we do not reject the null and so there exists no cointegration among all variables. Since they are co integrated, there exists both short term and long run relationship among variables which is now further examined using the VECM test.

*Vector Error correction model*

Vector Autoregressive (VAR) model is one of the special forms of system simultaneous equations. Model VAR can be applied only if the variables are not cointegrated. But since the variables taken here are both nonstationary and not cointegrated, VECM is used. It is a VAR model which has been designed for use white non-stationary data having cointegrating relationship. It is one of the time series modeling's which can directly estimate the level to which a variable can be brought back to equilibrium condition after a shock on other variables. VECM is very useful by which to estimate the short-term effect for both variables and the long run effect of the time series data.

A Vector Error Correction Model (VECM), which can be derived from the long-run cointegrating vectors, can be used to determine the direction of this causality.

$$\Delta Y_t = \alpha + \sum_{i=1}^{k-1} B_i \Delta Y_{t-i} + \sum_{j=1}^{k-1} \emptyset_i \Delta X_{t-j} + \sum_{m=1}^{k-1} \rho_i \Delta Z_{t-m} + \lambda_1 ECT_{t-1} + error\ term$$

$$\Delta X_t = \mu + \sum_{i=1}^{k-1} B_i \Delta Y_{t-i} + \sum_{j=1}^{k-1} \emptyset_i \Delta X_{t-j} + \sum_{m=1}^{k-1} \rho_i \Delta Z_{t-m} + \lambda_2 ECT_{t-1} + error\ term$$

$$\Delta Z_t = \theta + \sum_{i=1}^{k-1} B_i \Delta Y_{t-i} + \sum_{j=1}^{k-1} \emptyset_i \Delta X_{t-j} + \sum_{m=1}^{k-1} \rho_i \Delta Z_{t-m} + \lambda_3 ECT_{t-1} + error\ term$$

where,

k-1 = optimal lag length reduced by 1

$B_i, \emptyset_i, \rho_i$ = short run dynamic coefficients of the model's adjustment long run equilibrium

$\lambda_i$ = speed of adjustment parameter with a negative sign

$ECT_{t-1}$ = the error correction term is the lagged value of the residuals obtained from the cointegration regression of the dependent variable on the regressors. It contains long-run information derived from the long-run cointegrating relationship.
$Y_t$ = Log of GDP per capita, $X_t$ = Log of imports of electronics from Vietnam, $Z_t$ = Log of imports of electronics from China

TABLE VI: VECM results

| Variables | Log of GDP per capita ($Y$) | Log of electronics imports from Vietnam (X) | Log of electronics imports from China (Z) |
|---|---|---|---|
| $Y_{t-1}$ | .3011909 | -3.208052 | 1.69466* |
| $Y_{t-2}$ | -.1269102 | -1.941218 | .3131986 |
| $X_{t-1}$ | .0537457** | .1862277 | -.0652684 |
| $X_{t-2}$ | -.1042307** | .0350547 | -.2430585* |
| $Z_{t-1}$ | -.1513046 | .0694316 | -.5891285 |
| $Z_{t-2}$ | .2084848* | 1.503766** | .6636715* |
| ECT | -.0803116 | .8715176 | -.724025* |
| Constant | .0863859** | .2610035 | .3045909* |

TABLE VII: Long run equilibrium

| Log (GDP per capita) | Coefficient | Standard error | Z statistics | Prob. |
|---|---|---|---|---|
| Log (import of electronics from Vietnam) | -.222322 | .0225907 | -9.84 | 0.000 |
| Log (import of electronics from China) | .2290325 | .0418832 | 5.47 | 0.000 |

NOTE: Here * represents significance at 5% level and ** shows significance at 10% level.

So, the equations are as follows:

$$\boldsymbol{\Delta Y_t = 0.09 + 0.30\Delta Y_{t-1} - 0.13\Delta Y_{t-2} + 0.05\Delta X_{t-1} - 1.04\Delta X_{t-2} - 0.15\Delta Z_{t-1} + 0.21\Delta Z_{t-2} - 0.08\, ECT_{t-1}}$$

$$\boldsymbol{\Delta X_t = 0.26 - 3.21\Delta Y_{t-1} - 1.94\Delta Y_{t-2} + 0.19\Delta X_{t-1} + 0.04\Delta X_{t-2} + 0.07\Delta Z_{t-1} + 1.50\Delta Z_{t-2} + 0.87\, ECT_{t-1}}$$

$$\boldsymbol{\Delta Z_t = 0.30 + 1.70\Delta Y_{t-1} + 0.31\Delta Y_{t-2} - 0.07\Delta X_{t-1} - 0.24\Delta X_{t-2} - 0.59\Delta Z_{t-1} + 0.66\Delta Z_{t-2} - 0.72\, ECT_{t-1}}$$

And the long run equilibrium is:

$$ECT_{t-1} = Y_{t-1} - \eta_j X_{t-1} - \varepsilon_m Z_{t-1}$$

$$\boldsymbol{ECT_{t-1} = Y_{t-1} - 0.22X_{t-1} + 0.23Z_{t-1}}$$

Where,

$Y_t$ = Log of GDP per capita

$X_t$ = Log of imports of electronics from Vietnam

$Z_t$ = Log of imports of electronics from China

The long run model can be interpreted using elasticities. A percent increase in imports from China leads to a fall in income per head of India by .23% and an increase in the same by .22% when imported from Vietnam.

The error correction term coefficients represent the speed of adjustment which is very high here (-0.75). It can be said that when imports from Vietnam is too high then Chinese imports rapidly adjusts downwards to match the former levels. This makes a case that import of electronics from both the countries run in the opposite direction and hence Vietnam can be seen as a competitor to China. Additionally, high GDP per capita implies very fast fall in Chinese imports which explains a growth induced import demand. It gives us a case to reason that imports do not cause income per head and hence boycotting Chinese product might be feasible.

In addition to determining the direction of the causality, these equations may also be used to define short run causality. To formalize it more, Wald test has been used to check whether dependent variable reacts to only short-term shocks coming from the independent variables not.

TABLE VIII: Results of Wald Causality test

| Ho: Null hypothesis | Chi squared | Prob. | Decision |
|---|---|---|---|
| Imports of electronics from China does not cause GDP per capita in short run | 4.28 | 0.1178 | Don't reject |
| Imports from Vietnam does not cause GDP per capita in short run. | 3.76 | 0.1528 | Don't reject |
| GDP per capita does not cause import of electronics from China in short run. | 5.79 | 0.0553 | **Reject** |
| GDP per capita does not cause import from Vietnam in short run. | 0.61 | 0.7373 | Don't reject |

This indicates no bidirectional short-term causalities between GDP per capita and electronics imports from Vietnam. But there exists a unidirectional near run

causalities when it comes to China since GDP per capita causes imports of electronics from China and not vice versa. Hence, imports from both the countries does not cause income per head in the short run.

## -Conclusion-

The tool of revealed comparative advantage cautioned us against the sole dependence of domestic manufacturing base to meet the growing demand of electronics and hence we felt the need to look out for import diversification where Vietnam emerged as a suitable alternative. The cointegration tests shows that there exists a long run equilibrium relationship among GDP per capita and import of electronics from China and Vietnam. More specifically, since it has been established that an increase imports from Vietnam increases income per head by 0.22% but imports from China reduces the same by 0.23% it makes economic sense to reduce dependency on China. Additionally, Chinese imports

doesn't induce a growth in Indian GDP per capita but rather it is driven by the economic growth. Since Vietnamese imports act as a competitor to Chinese, if India were to import electronics from Vietnam then it will automatically let go of its resilience on Chinese goods. The VEC model speaks volume and hence presents a strong case to move from China to Vietnam.

## Appendix

*Skewness of the variables in the double log regression model and log transformation:*

The variables considered in the VECM are in the log form to ensure normality and stationery of the same.

TABLE IX: Skewness

| Variables | Import of electronics from China | Import of electronics from Vietnam | Indian per capita GDP |
|---|---|---|---|
| *Skewness* | 1.099963 | 2.623952 | .7361335 |
| *Log skewness* | -.7318895 | -.1691425 | .3176243 |

*Testing for autocorrelation*

Serial correlation or autocorrelation occurs when the error terms in the model are related. When autocorrelation is present, the OLS procedure still produces unbiased estimates but increases the variances hence the OLS estimators ceases to be BLUE. Using the Lagrange-multiplier test:

$H_0$ = There is no autocorrelation

TABLE X: Autocorrelation

| Lags | Chi-squared | Prob. |
|---|---|---|
| 1 | 13.2851 | 0.15012 |
| 2 | 8.8005 | 0.45589 |

Since p value is more than 0.05, we cannot reject the null hypothesis and hence the model does not suffer from the problem of autocorrelation.

*Testing for normality of errors*

This means while taking the average, positives tend to cancel negatives of the error terms and hence mean=0. The central limit theorem ensures that errors follow such distribution for large observations. The t-test and F- test are not applicable unless the error term is normal distributed. Using the Jarque-Bera normality test on the residuals:

TABLE XI: $H_0$: Errors are normally distributed

| Equation | Chi-squared | Prob. |
|---|---|---|
| **Δ**log of GDP per capita | 0.010 | 0.99522 |
| **Δ**log of electronics imports from China | 0.378 | 0.82790 |
| **Δ**log of electronics imports from Vietnam | 0.192 | 0.90843 |
| All | 0.579 | 0.99673 |

Since p value is more than 0.05, we cannot reject the null hypothesis and hence the residuals are normally distributed.

*Testing for model stability*

TABLE XII: Using the eigenvalue stability condition:

| Eigenvalue | Modulus |
|---|---|
| 1 | 1 |
| 1 | 1 |
| -.8601394 | .860139 |
| .6723458 + .4080283i | .786471 |
| .6723458 - .4080283i | .786471 |
| .7792462 | .779246 |
| -.09342306 + .723929i | .729932 |
| -.09342306 - .723929i | .729932 |
| -.6185566 | .618557 |

The VECM specification imposes 2-unit moduli and hence model is stable.

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*Data for all the figures have been derived from World trade database and World Integrated trade solution


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## Conflict of Interests

The authors declare no conflict of interest.

## Behind the Paper

Kashish Gupta and Kanika Gupta co-authored the paper "Muting the Dragon's Ringtone: A case for the transition of the Indian Electronics Industry from China to Vietnam," which was selected by the Editors as the Featured Article of this Issue. Featured authors are given the opportunity to share with us a glimpse into their motivation behind their research thesis and the decision to submit their manuscripts on GJAE. Below is what our two authors had to say:

Last year, when the COVID- 19 pandemic unleashed its economic consequences by disrupting supply chains across industries, the disastrous impact on the Indian electronic industry was widely covered by Indian leading newspapers. Being avid readers, we constantly discussed and debated the call to 'Boycott Chinese Product' among ourselves. Due to the Indian overdependence on Chinese manufacturers and the considerable proportion of electronics in the trade balance, many economists were quick to suggest feasible alternatives to China.

Being economics students, the possibility of studying the efficacy of these alternatives got us intrigued. Moreover, being an active citizen of the country and a part of the demographic dividend, we strongly believed that if we can come up with concrete alternatives to China, we can influence actual policies of the country. We quickly grabbed this as a golden opportunity to apply our macroeconomics, international trade, and econometric coursework to real-life cases. As aspiring policymakers, this research study exposed us to the power of data-driven and fact-based conclusions and decisions.

Having worked on this paper for more than four months and getting it supervised by leading professors, we were very sure of its quality and the importance of the results. Hence, all we wanted was the right platform and the right audience to read it.
But our endless search for quality economic journals hit a roadblock when we realized that almost every journal asked for a publication fee of £100 - 200. Being non-working students, bearing such high cost was not a possibility. Around that time, GAEE opened

its application for its journal. Being one of the few economics journals in the world to waive the publication fee, it was the right platform for students like us. We felt fortunate. Being the co-founder of the GAEE chapter of Lady Shri Ram College (LSR), Kanika was sure about the authenticity and reach of the journal.

This journal gives a twofold advantage to our readers and us. Firstly, our results will finally reach the right kind of audience. Secondly, we will be able to disseminate economics literacy to aspiring young economists like us from developing and marginalized communities through our work.

Finally, after three months of patience, we are incredibly grateful that our paper has been nominated to be featured in this issue. Just like GAEE's vision is to empower students to learn economics, this journal has also empowered us to undertake high-quality research in the future.

~ Kashish Gupta & Kanika Gupta

Kashish Gupta is a final year student at Shri Ram College of Commerce, Delhi University pursing B.A. (Hons) Economics and an incoming M.Sc. Economics student at the London School of Economics and Political Science (LSE). A resident of India, the author is strongly motivated by the geopolitical moves of the country and wants to specialize in the same. She has worked at the Ministry of Commerce and Industry, India as an International Trade policy and development intern. She has successfully led a team of 60 consultants at 180Degrees Consulting SRCC, world's largest student run pro bon consulting organization. Ms. Gupta has delved into multiple research projects, some of which are, women in agriculture, impact investing and pollution hazard in Eurasia using the tools of econometrics and comparative data analytics.

Kanika Gupta is pursuing B.A. (Hons) Economics at Lady Shri Ram College for Women, University of Delhi. A second-year student, the author is a resident of India. In the past she has interned with Kawasaki Heavy Industries Private Limited in the field of Finance. She co-founded the LSR chapter of GAEE and is also heading the Finance Cell of Economics Department at LSR. Ms. Gupta's interest in research stems from her experience as a Student Consultant and Research Analyst in fields of specific booms, consumer behavior and international trade relations.