

## American bilateral trade with emerging economies and its influence on world economic recovery post Covid-19: Analysis through VECM\*

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**Abstract.** *Covid-19 Pandemic has slumped the growth of entire world economy. In this globalized world each economy is interdependent on one another. In this context, the degree and intensity of trade between major economies of the world has the potential to play a significant role in global economic recovery. Our study aims to analyze the intensity of pandemic's shock on American trade with prominent emerging economies and its subsequent influence on world economic recovery. By doing so, our study aims to provide useful insights for policy makers.*

**Keywords:** Covid-19, bi-lateral trade, major economies, emerging economies, GDP, VECM.

**JEL Classification:** F21, F29, F43, F47, G15, G17.

## Introduction

World economy has suffered due to subsequent waves of pandemic. According to estimates of International Monetary Fund, the world economy had shrunk by 4.4% in 2020. Some experts have compared post pandemic shock to that of Great Depression which occurred in 1930's (Alqahwachi et al., 2021). Irrespective of the strength of economies, all countries have suffered due to economic shock caused by pandemic. The shock had both short term and long-term implications. When we see the immediate effect, there was severe loss of lives and livelihood across the world. However, the true brunt of the pandemic's shock is to be found in its aftermath. Economies receiving a shock is one thing. Economies recovering from the same is a whole different saga. If capital indices are to be regarded as barometers of economy, then they had a sordid tale to tell in the first few months of the crisis. Nikkei, Nifty, Dow Jones Industrial Average and Financial Time Stock Exchange all were adversely hit and saw significant falls in their values.

In fact, the shock was so severe that Financial Time Stock Exchange fell by 14.3 percent in 2020, which was its worst performance since 2008 (The Guardian 2021). According to report of International Monetary Fund, 8.9 percent of active labour force lost their job in United States (Jones et al., 2021). Although job vacancies have returned to normal in few countries like Australia, in vast majority of countries like United States, India, United Kingdom, Spain, it most certainly, has not been the case. Many of the experts are of the opinion that, it could be years before the major economies of the world could revert to normalcy. The only silver lining for the world economy in 2020 was China. As it was the only major economy of the world which recorded a positive growth rate in 2020 (Cheng, 2021).

In the backdrop of first wave, although IMF made a prediction of global growth of 5.9 percent in 2021, World Bank's prediction in the aftermath of first wave was at a more modest baseline of 4.2 percent. According to recent IMF projections, emerging economies like India and China along with advanced economies have the potential of rallying world recovery (IMF, 2021). IMF is of the opinion that international trade can play a vital role in aiding global economic recovery. In this backdrop our research tries to analyze the pandemic's shock on bilateral trade of United States with prominent emerging economies like China and India. The premise of the study is to analyze the speed of adjustment of these significant bilateral trades. Given the prominent interlinkages that these economies have with the world, the speed of adjustment could be used as an indicator to gauge the speed at which world economy may recover, *ceteris paribus*.

First and foremost, United States is the largest economy in the world. It is interconnected with every major economy of the world through forward and backward linkages (Kose et al., 2017). According to recent International Monetary Fund Report, we observe that unemployment in America was as high as 8.9 percent (Jones et al., 2021). For any major economy in the present globalized world, employment generation at domestic level is inherently proportional to the quantum of trade that the country is having with the rest of the world. Various studies have already found that America engaging in international trade is not only beneficial to America (van den Bossche and Zdouc, 2012; CEA Trade Report, 2015), but it is also beneficial to the world (Cimino-Isaacs, 2021). Be it through boosting

purchasing powers of Americans, or expansion of Markets for Multinational Companies of United States (Slaughter, 2010) or enhancing gross value of American private sector (Cummings et al., 2010). Emerging economies like China, Mexico and India provide good market for American products. In this context it becomes pertinent for us to analyze the effect of pandemic on American bilateral trade with emerging economies.

### 1. Analyzing American bilateral trade with emerging economies

Pandemic has adversely affected major economies of the world (Shen, 2020). Global GDP is moving in a downward trend (Mau, 2020; Maliszewska et al., 2020). United States being the largest economy in the world has the potential to play a significant role in aiding the world economy to recover. International Monetary Fund has stated that emerging economies are going to play a prominent role in assisting the world economy to revert back to normalcy. It is well established fact that international trade is the cornerstone of world economy. Hence, in Global economic recovery, international trade has a pivotal role to play. In this backdrop, the objective of our research paper is twofold. On one hand, we wanted to analyze as to what extent American bilateral trade is adversely affected due to impact of pandemic along with the speed of adjustment therein. On the other hand, in the backdrop of IMF's faith in prominent emerging economies like India and China, we wanted to know the extent to which their international trade along with America could assist in world economy to revert to normalcy. In this context, based on our results, we wanted to give relevant insights to policy makers.

Based on the aforementioned objectives, our research paper has two important dimensions. First, we want to analyze the intensity and magnitude of disruption caused by the pandemic on American bilateral trade with prominent emerging Economies like China, Mexico and India. In the first part we have empirically analyzed the intensity and magnitude of American bilateral trade with emerging economies through GARCH model.

#### **Bilateral trade between United States and China**

China is a prominent trade partner of United States. IMF has stated that United States and China are going to play a prominent role in aiding global recovery (The Print, 2021). In this backdrop analyzing the dynamics of trade between these two prominent economies becomes pertinent in understanding the pace of global recovery. The importance of the trade between them can be understood by the fact that each country is other's largest trade partners by value. To understand the significance and bilateral trade we have taken exports of United States to China from 2016 to 2021. If we had taken annual or quarterly data, then there would be significant loss of information pertaining to our analysis. To overcome the above constraint, instead of taking the volume or value of trade, we have taken the terms of trade between the countries on daily basis. For understanding the terms of bilateral trade between the countries we have taken foreign exchange rate as a proxy. The rationale behind taking foreign exchange rate as proxy to understand the terms of trade between the said variables is based on theoretical underpinnings. The theoretical underpinning is that exchange rate of any nation's currency is determined by the forces of demand and supply. In bilateral context, when we see a nation's currency is appreciating corresponding to

another nation's currency, it is not just that, a nation is demanding another nation's currency. It fundamentally means that, one nation's import of another nation's good has increased. To illustrate the statement better, if we were to take the two countries to be China and America, and if American Dollar's Value in terms of Yuan is appreciating, it basically means that, American exports to China has increased. In other words, China's import of American goods has increased. Here, we would like to point out that, import and export implicitly shows the strength of the economies in question. Hence, in our present study we have taken demand for American Dollar in terms of Chinese Yuan to be proxy for China's demand for American goods. To analyze post pandemic shock on American Bilateral trade with China, we have used GARCH model. The results of the same is summarized in Table 1 and Figure 1.

**Table 1.** GARCH model relating to US exports to China

Variable	Coefficient	Standard Error	z-Statistic	Probability
C	3.89E-05	4.44E-05	0.876453	0.3808
AR(1)	-0.137745	0.021477	-6.413545	0.0000
MA(25)	0.050021	0.0184348	2.726326	0.0064
Variance Equation				
C	1.54E-06	7.76E-07	1.978817	0.0478
RESID(-1) <sup>2</sup> GARCH(-1)	0.091416	0.035651	2.564190	0.0103
	0.696987	0.130255	5.350931	0.0000
GED Parameter	0.956552	0.044728	21.38576	0.0000

**Notes:** GARCH model was run by taking dependent variable as US exports (RETURNSUSE) for which American dollars demand by China was taken as proxy variable. 1299 observations were included. Convergence was achieved after 29 iterations. Method utilised was MLARCH-Generalised error distribution (GED) (OPG-BHHH/Marquardt steps); GARCH = C (4) + C(5) × RESID(-1)<sup>2</sup> + C(6) × GARCH(-1).

In the above table we are more concerned about the variance equation than the mean equation to understand the impact of disruption caused by pandemic. Before going to make the inferences there are few points we need to verify for reliable predictions from our model. To begin with convergence must be achieved by our model. Our model has achieved convergence after 29 iterations. Further we were able to ascertain that the necessary conditions for Variance equation of GARCH model is also satisfied.

The GARCH equation reflecting Chinese demand for American Dollar can be represented as:

$$\text{U.S. Exports to China (US \$ demand by China)} = 1.54\text{E-}06 + 0.09 + 0.69 \quad (1)$$

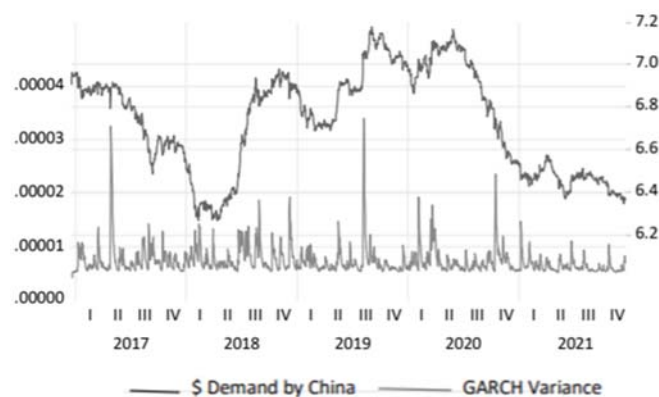
The GARCH variance series of American Dollars demand in terms of Chinese Yuan which is taken as a proxy for American exports to China along with GARCH variance for the series is represented in Figure 1. From GARCH Equation, we can estimate the rate at which any shock subsides in the volatility. The equation for estimating the same is

$$1 - \alpha - \beta \quad (2)$$

From our GARCH equation, we can infer that the value of  $\alpha = 0.09$  and value of  $\beta$  is 0.69. Thus, the rate at which any shock's effect subsides in volatility can be estimated by substituting the values of  $\alpha$  and  $\beta$  in in equation (2). Hence the rate at which the shock subsides after disruption of bilateral trade between United States and China is at the rate of 0.22 units United States is the largest trading partner of India. India is the 9<sup>th</sup> largest trading

partner of United States. Other than that India is a prominent emerging economy. As stated by IMF, India is one of the prominent major emerging economies. Some of the prominent experts are of the view, emerging economies like India and China can play a vital role in accelerating the speed of global recovery (Jones et al., 2021). In this backdrop, we wanted to analyze the speed of adjustment in American bilateral trade with India. Indian demand for dollar in terms of rupee has been taken as a proxy for American exports to India. We have run a GARCH model to understand the rate at which the shock caused by pandemic is going to subside and to find out as to when the volatility shall revert to normalcy.

**Figure 1.** American exports to China with corresponding GARCH variance



**Bilateral Trade between United States and India**

The summary of the GARCH equation is summarized in Table 2.

**Table 2.** GARCH model relating to US exports to India

Variable	Coefficient	Standard Error	z-Statistic	Probability
C	-8.02E-05	6.98E-05	-1.14973	0.2502
AR(1)	-0.118406	0.027269	-4.4342129	0.0000
MA(25)	-0.060354	0.023618	-2.555419	0.0106
		Variance Equation		
C	5.68E-07	2.10E-07	2.708580	0.0068
RESID(-1) <sup>2</sup>	0.103956	0.022720	4.575605	0.0000
GARCH(-1)	0.859471	0.032155	26.72917	0.0000
GED Parameter	1.264290	0.055974	22.58698	0.0000

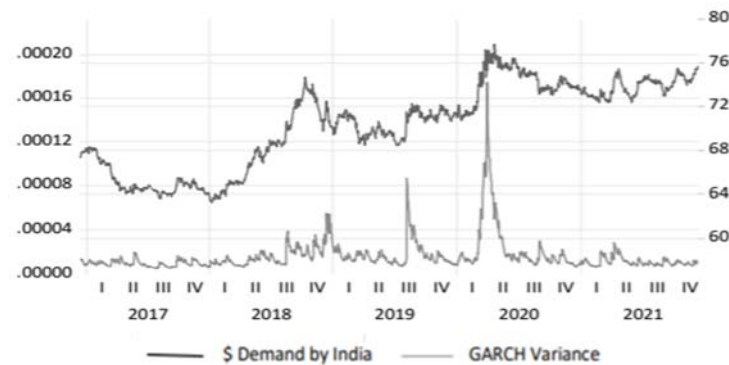
**Notes:** GARCH model was run by taking dependent variable as US exports (RETURNSUSEI) for which American dollars demand by India was taken as proxy variable. 1300 observations were included. Convergence was achieved after 34 iterations. Method utilised was MLARCH-Generalised error distribution (GED) (OPG-BHHH/Marquardt steps);  $GARCH = C(4) + C(5) \times RESID(-1)^2 + C(6) \times GARCH(-1)$ .

From the above table we can see that as our model is achieving convergence after 34 iterations, hence our model is reliable for making predictions. Further, we can observe that, all the relevant variables related to mean and variance equation are significant. Moreover, in the variance equation, it is pertinent to observe that all the independent variables are significant and  $(\alpha + \beta < 1)$ . Hence, the GARCH equation representing demand for American Dollars in terms of Indian rupees which is taken as a proxy for American Exports to India is depicted below:

$$U.S. \text{ Exports to India (US \$ demand by India)} = 5.68E-07 + 0.10 + 0.85 \tag{3}$$

In the above equation  $\omega$  is  $5.68E-07$ ,  $\alpha = 0.10$  and  $\beta = 0.85$ . The GARCH variance series of American Dollars demand in terms of Indian Rupee is represented in Figure 2.

**Figure 2.** American exports to India with corresponding GARCH variance



### Bilateral trade between Unites States and Mexico

Substituting the value of alpha and beta in equation (2), we can estimate the rate at which the effect of the shock subsides in the series. Thus, in case of any disturbance between the bilateral trade between India and America, the speed at which the shock subsides, and the volatility reverts to normalcy is at the rate 0.05 units. Mexico is one of the prominent emerging economies. In terms of quantum of trade, it has with United States, it is the 3<sup>rd</sup> largest trading partner of United States. And United States is the largest trading partner of Mexico. As in the above cases, even here, for understanding the shock of pandemic on United States exports to Mexico, we have taken demand of American Dollar in terms of Mexican Peso as proxy. The GARCH results of the said relation is summarized in Table 3.

**Table 3.** GARCH model relating to US exports to Mexico

Variable	Coefficient	Standard Error	z-Statistic	Probability
C	-0.000280	0.000195	-1.430942	0.1524
AR(1)	-0.921226	0.032242	28.57187	0.0000
MA(25)	-0.921118	0.033116	-27.81530	0.0000
Variance Equation				
C	2.42E-06	8.53E-07	2.839309	0.0045
RESID(-1) <sup>2</sup> GARCH(-1)	0.122368	0.022781	5.371425	0.0000
	0.840333	0.033116	26.21411	0.0000
GED Parameter	1.498244	0.071042	21.08964	0.0000

**Notes:** GARCH model was run by taking dependent variable as US exports (RETURNSUSE) for which American dollars' demand by Mexico was taken as proxy variable. 1295 observations were included after adjustment. Convergence was achieved after 23 iterations. Method utilised was MLARCH-Generalised error distribution (GED) (OPG- BHHH/Marquardt steps);  $GARCH = C(4) + C(5) \times RESID(-1)^2 + C(6) \times GARCH(-1)$ .

From the above table we can observe that as the series generated by our model is achieving convergence after 23 iterations, the predictions generated by our model is reliable. We further see that, the relevant independent variables of mean and variance equation are significant. Moreover, in variance equation not only the values of  $\omega$ ,  $\alpha$  and  $\beta$  are positive, but as  $(\alpha + \beta < 1)$ , we can ascertain that even stationarity condition is also fulfilled. The GARCH variance series of American Dollars demand in terms of Mexican Peso is represented in Figure 3.

**Figure 3.** American exports to Mexico with corresponding GARCH variance

Our final GARCH equation can be represented as under:

$$\text{US exports to Mexico (US \$ demand by Mexico)} = 2.42 \text{ E-}06 + 0.12 + 0.84 \quad (4)$$

In the above equation  $\omega$  is 2.42 E-06,  $\alpha = 0.12$  and  $\beta = 0.84$ . Substituting the value of alpha and beta in equation (2), we can estimate the rate at which the effect of the shock subsides in the series. Thus, in case of any disturbance between the bilateral trade between America and Mexico, the speed at which the shock subsides, and the volatility reverts back to normalcy is at the rate 0.04 units.

### **Overall inferences from the GARCH series dealing with bilateral trade of America with China, India and Mexico respectively**

From the above results that we have got, we observe that the speed at which the shock is going to subside in volatility of American bilateral trade is found to be 0.22 with China, 0.05 with India and 0.04 with Mexico. When we see the rate at which the shock is going to subside, American Bilateral trade with China seems to be the most resilient. This was on expected terms as United States and China are each other's largest trading partners and the strongest economies in the world. Given the magnitude of political and economic dynamics that is between these nations and each other's gravitas in world economy, both the countries would be very keen to address the shock and revert back to normalcy in earnest.

However, when we see the quantum of trade between United States-China, US-Mexico and United States-India, in 2020: United States trade with China was about \$615.2 billion; United States trade with Mexico was \$582.4 billion; United States trade with India was \$146.1 billion. When we see the rate of subsiding of shock through the prism of quantum of trade, we expect the rate of shock's subsidence to be highest in American bilateral trade with China followed by Mexico and then India. However, in our empirical analysis, we have found that the rate of subsidence of shock was highest in case of China, followed by India and then Mexico.

Our empirical results, though at superficial level may seem inappropriate, when we critically look at the factors affecting the phenomenon of subsidence of shock, our empirical results are actually reflecting the reality. The rationale of our results is summarized below:

For any shock to subside in bilateral trade, mutual policy initiatives of the countries in question are going to play an important role. Even in that, dominant trade partner's role is going to be highly significant. In this context, what we want to underline is that our results should not be analyzed only by taking into consideration the economic dimension but should be analyzed by taking into consideration political dimension as well. In this context, the rate at which the shock would subside is expected to be the highest between China and America, which has been justified by our empirical result.

However, what may seem to be an anomaly is that given the size of Indian economy and its influence in international forum, the rate of subsiding of shock between American bilateral trade with India was expected to be, at least in the range of around 0.08 to 0.10. However, the rate of shock's subsidence is only 0.05 which is slightly higher than Mexico's 0.04. The rationale for this could be understood if we were to analyze the dynamics of relation by taking both political and economic dimensions into consideration. India is much more prominent economy than Mexico in every dimension. However, according to Gravity model of international trade, the magnitude of bilateral trade is inversely proportional to the distance between the economies. Hence, the quantum of trade between America and India is barely one-fifth as compared to the bilateral trade which is happening between America and Mexico. Yet the rate of subsiding of shock is higher in India as compared to Mexico as India's gravitas in world political affairs has significantly more influence than that of Mexico. In making any policy decision any rational Government of a nation has to take into consideration both political and economic standing of the other nation. India is not only one of the fastest growing prominent emerging economies, but it is also viewed as a bulwark for maintaining peace and stability in Asia- Pacific region by United States. Hence, when we look through economic prism alone, India's bilateral trade with America most certainly doesn't have as much of a weight as that of American bilateral trade with Mexico, however when we look through both political and economic dimension, it is difficult to ascertain which nation is more important to America. That seems to be the most probable reason as to why the rate of shock's subsidence of India and Mexico seem to be very close at 0.05 and 0.04 respectively.

### **Implication of American bilateral trade with emerging economies and its influence on world economic recovery**

In the first part of the paper, we tried to analyze the impact and magnitude of pandemic's shock on American bi-lateral trade with emerging economies. Now in this part of our study, we want to find out as to how American bilateral trade can help in world economic recovery. To achieve the same, we have taken the imports and exports data of America, India and China along with world GDP to understand as to how the trade among the countries in question shall influence world economic recovery. In this part of our analysis, we have considered America as it is the strongest economy in the world. Further, we have considered India and China, as many economic experts feel that India and China are going to play a prominent role in helping the world economy to recover (Jones et al., 2021). This analysis is further divided into two parts:

On one hand, we have run Johansen System of Cointegration and Vector Error Correction model by taking exports data of America, India and China along with World GDP. In this



case, world GDP is considered as dependent variable and exports of the above-mentioned economies are considered as independent variables. The rationale behind running cointegration and vector error correction models by linking exports and imports of the said economies separately with world GDP was to overcome the problem of multicollinearity.

Readers may find that there is discrepancy in the time range of data that we have taken in this part of our analysis with the previous part. The rationale for choosing different timelines for the corresponding analysis are as follows:

In first part of our study, we were more interested to know the impact of Covid- 19 on bilateral trade of America with emerging economies. To get meaningful inferences, we had to get data of higher frequency, which couldn't be satisfied with quarterly or annual data of exports and imports. To circumvent the said problem, we used demand of American dollars with the said emerging economies as a proxy for American bilateral trade with those economies.

However, in this part of our analysis, we had two different series of variables covering different dimensions. On one hand we had imports and exports data of the prominent economies of the world as independent variables and on the other hand we had World Gross Domestic Product as the dependent variables. Here we needed to get all the data corresponding to all variables in the same frequency. Using foreign exchange rate as a proxy for exports or imports of the prominent economies was out of the question as we would not get corresponding data for world GDP in the same frequency. Moreover, to understand the trend of world GDP, it was necessary for us to have a longer time frame covering four or five decades. So, to get meaningful inferences, we have taken data from 1970 to 2020. As in the time in which we were preparing our paper, data related to 2021 was not available across all the variables, we have not included data pertaining to 2021 as part of our analysis.

Imports or exports in themselves have the potential of reflecting the strength of the economy. However, some nations may import raw material or intermediary product, process the same and export. Thus, if we were to include both imports and exports and construct a model relating the said variables to world GDP, it might be susceptible to the problem of multicollinearity. So, in our study, to understand the association between international trade of prominent economies and to analyze as to when the world economy shall revert to normalcy, we have tested Johansen system of cointegration with two sets of models. In one model, we have associated exports of these prominent economies to the world GDP. In another model, we have associated imports of these prominent economies with world GDP. As, we were working with more than 2 series we have used Johansen system of cointegration to ascertain whether the concerned series were cointegrated or not. The prominent economies we have chosen are America, India and China. The rationale behind choosing these economies is as follows: American economy is the predominant economy in the world. We wanted to analyze as to how its trade policy with the world is going to affect the world economic recovery. The rationale behind choosing India and China was in the backdrop of the magnitude and rate of growth of their economies, which many experts feel can play a prominent role in aiding world economic recovery. In this context, we wanted to verify as to whether the exports of China and India would play a significant role in assisting the World GDP to revert to mean. In addition to that these

countries have strong mutual trade relations with each other. For instance, China and United States are largest trading partners of each other. China and United States are top trading partners of India by value.

Before using cointegration model to analyze as to whether the series were cointegrated or not we wanted to ascertain as to whether the series were integrated at same order or not through Augmented Dickey Fuller test. Through ADF test we were able to confirm that, the series were integrated at I (1). After this assertion, through standard vector auto regression, we estimated optimum lag. Results of optimum lag length are summarized in Table 4.

**Table 4.** Overview of VAR lag order selection criterion

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-8.824589	NA	2.03e-05	0.545727	0.703187	0.604980
1	262.2565	484.4854	3.93e-10	-10.30879	-9.521490	-10.01252
2	276.8602	23.61444	4.24e-10	-10.24937	-8.832235	-9.716092
3	293.1407	23.55488	4.36e-10	-10.26131	-8.214337	-9.491019
4	319.0851	33.12046	3.09e-10	-10.68447	-8.007664	-9.677171

**Notes:** In the above estimation, the endogenous variables are log (World GDP), log (China's exports), log (India's exports), log (US exports); Sample has been taken for the period from 1970 to 2020. Lag 4 was found as optimum as per LR, FPE and AIC criterion. Lag 1 was found as optimum by SC and HQ criterion.

From the above table we can see that, three out of five criteria are suggesting lag length of four. Hence, we selected our optimum lag length as four. After estimating optimum lag, since we were dealing with multiple series, we used Johansen Cointegration test to find out as to whether the series were cointegrated or not. The results of trace test statistics and max eigen value test statistics are summarized in Tables 5 and 6 respectively.

**Table 5.** Results from unrestricted cointegration test (trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Probability
None	0.691342	95.87053	47.85613	0.0000
At most 1	0.443450	40.62106	29.79707	0.0020
At most 2	0.175657	13.07916	15.49471	0.1119
At most 3	0.081590	4.000249	3.841465	0.0455

**Notes:** Johansen system of cointegration was run to estimate as to whether World GDP was cointegrated with Exports of United States, India, and China or not. Trace Statistic indicates that there are 2 cointegration equations which are significant at 0.05 level. It is also to be noted that Mackinnon-Haug-Michelis (1999) p-values have been used in estimating probability.

**Table 6.** Results from unrestricted cointegration test (Maximum Eigen Value)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Probability
None	0.691342	55.24947	27.58434	0.0000
At most 1	0.443450	27.54190	21.13162	0.0055
At most 2	0.175657	9.078914	14.26460	0.2796
At most 3	0.081590	4.000249	3.841465	0.0455

**Notes:** Johansen system of cointegration was run to estimate as to whether World GDP was cointegrated with Exports of United States, India, and China or not. Max-Eigen test Statistic indicates that there are 2 cointegration equations which are significant at 0.05 level. It is also to be noted that Mackinnon-Haug-Michelis (1999) p-values have been used in estimating probability.

From the above tables, through both Trace test Statistics and Maximum Eigenvalue test statistics, we can ascertain that there are at least 2 cointegrating equations.

As, the series are cointegrated, we can run Vector Error Correction model and understand the long run and short run dynamics of the given series. The results of Vector Error Correction model are summarized in Table 7.

**Long run association of variables**

In Table 7, CointEq1 shows the long run behavior of the variables. From this equation we can observe that, World GDP is going to revert to normalcy in the long run. Indian exports is found to assist in aiding world GDP to revert back to mean by 3 percent, which is statistically significant. Although statistically not significant, it is observed that the exports of United States is going to help the world GDP to revert to mean by 1 percent. Another interesting statistically significant inference from our study is that increase in Chinese exports doesn't seem to assist in world GDP to revert to mean.

**Table 7.** Overview of vector error correction estimates

Error Correction	D (log World GDP)	D (log US Exports)	D (log Indian Exports)	D (log Chinese Exports)
CointEq1	-0.014958 (0.00535) [-2.79809]	-0.011158 (0.00881) [-1.26609]	-0.030185 (0.00930) [-3.24451]	0.033646 (0.01525) [2.20615]
D (log World GDP (-1))	0.444699 (0.20627) [2.15595]	0.405859 (0.34006) [1.19350]	0.283094 (0.35898) [0.78861]	0.625249 (0.58848) [1.06248]
D (log World GDP (-2))	0.262798 (0.20232) [1.29893]	0.380913 (0.33355) [1.14199]	0.514334 (0.35211) [1.46073]	1.103369 (0.57722) [1.91153]
D (log World GDP (-3))	0.377249 (0.21429) [1.76049]	0.728869 (0.35328) [2.06213]	0.789505 (0.37294) [2.11699]	-0.311036 (0.61136) [-0.50876]

**Notes:** Vector Error Correction Model was run to estimate as to long run and short run dynamics with World GDP as dependent variable and Exports of United States, India, and China as independent variables. The time period of sample was from 1974 to 2020 after adjustments.

This could be most probably because of China's way of promoting its exports may not be conducive in aiding other countries build their domestic strength. This may be due to the following factors: There is evidence that suggest China has devalued its currency by more than the permissible limits set by IMF in order to promote its exports (Mercurio and Sze Ning Leung, 2009). Moreover, there is increasing evidence which suggest that China's One Belt One Road initiative is pushing many participating countries across the board into debt trap (Chandran, 2019; Hurley et al., 2021; Mourdoukoutas, 2018; Basak, 2021;). So Chinese self-driven developmental model may not be conducive for holistic development of all the countries.

**Short run association between variables**

When we observe the short run dynamics between the variables, significant results are obtained in the period of third lag. In third lag we observe that exports of United States and India are able to correct nearly 72 and 78 percent of World GDP's deviation in short run.

**Influence of independent variables on dependent variable**

To assess the influence of independent variables on dependent variable, particularly in short run, we ran Wald test.

In the Wald Test, the null hypothesis, which we had taken for testing was:

$$H_0: C(5) = C(6) = C(7) = C(8) = C(9) = C(10) = C(11) = C(12) = C(13) = 0 \quad (5)$$

In the above equation C5, C6 and C7 are constants of United States exports with 1, 2 and 3 lags respectively. C8, C9 and C10 are constants of Indian exports with 1, 2 and 3 lags respectively. C11, C12 and C13 are constants of Chinese exports respectively. If we are able to reject the null hypothesis, it could mean that, exports of all the countries together can assist in the world economy to revert back to mean. The results of Wald test are summarized in Table 8:

**Table 8.** Overview of Wald test

Test Statistic	Eigenvalue	Max-Eigen Statistic	Probability
F-Statistic	2.478166	(9,33)	0.0277
Chi-square	22.30349	9	0.0080

From the Wald test results, we can reject the Null hypothesis. Hence, exports of these major economies together have the potential to assist the world economy to revert back to mean.

### Association between imports of prominent economies and World Economy reverting to normalcy

Strength of an economy can be assessed by both its capacity to import as well as to export. So, in this part of our analysis, we wanted to assess as to how the imports of these prominent economies could assist the world economy to revert to mean. To begin with, through Augmented Dickey Fuller test we found that the import series of these prominent economies along with world GDP were stationery at same level i.e., I (1).

Prior running Johansen cointegration test, we estimated the various criterion for identifying lag optimum lag length criterion. The results are summarized in the Table 9.

**Table 9.** Overview of VAR lag order selection criterion

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-32.12477	NA	5.47e-05	1.537224	1.694684	1.596477
1	215.0945	441.8388	2.92e-09	-8.301895	-7.514598	-8.005630
2	227.6223	20.25771	3.44e-09	-8.154142	-6.737007	-7.620864
3	240.6132	18.79535	4.07e-09	-8.026095	-5.979123	-7.255806
4	254.1734	17.31091	4.89e-09	-7.922274	-5.245465	-6.914973

**Notes:** In the above estimation, the endogenous variables are log (World GDP), log (China's imports), log (India's imports), log (US imports); Sample has been taken for the period from 1970 to 2020. Lag 1 was considered as optimum lag by LR, FPE, AIC, SC and HQ criterion.

From Table 9, we can observe that, nearly all the criteria are suggesting optimum lag length to be 1, hence, to run Johansen system of cointegration we have chosen optimum lag as 1. Both the results of trace test statistics as well as maximum eigenvalue are summarized in the Table 10.

**Table 10.** Results from unrestricted cointegration test (trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Probability
None	0.473149	46.35802	47.85613	0.0687
At most 1	0.169876	14.95697	29.79707	0.7829
At most 2	0.087435	5.834149	15.49471	0.7150
At most 3	0.027192	1.350866	3.841465	0.2451

**Notes:** Johansen system of cointegration was run to estimate as to whether World GDP was cointegrated with imports of United States, India, and China or not. Trace Statistic indicates that there are no cointegration equations which are significant at 0.05 level. It is also to be noted that Mackinnon-Haug-Michelis (1999) p-values have been used in estimating probability.

**Table 11.** Results from unrestricted cointegration test (Maximum Eigen Value)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Probability
None	0.473149	31.40105	27.58434	0.0154
At most 1	0.169876	9.122820	21.13162	0.8224
At most 2	0.087435	4.483283	14.26460	0.8051
At most 3	0.027192	1.350866	3.841465	0.2451

**Notes:** Johansen system of cointegration was run to estimate as to whether World GDP was cointegrated with imports of United States, India, and China or not. Max-Eigen test Statistic indicates that there is 1 cointegration equation which is significant at 0.05 level. It is also to be noted that Mackinnon-Haug-Michelis (1999) p-values have been used in estimating probability.

From Tables 10 and 11, we observe that, although trace statistics has failed to ascertain that there exists any cointegration among the chosen series, Maximum Eigen Value indicates that there is 1 cointegrating equation among the series. Based on the available literature, it is found that Trace statistics are better indicator of presence or absence of cointegration as compared to Maximum Eigen Value. Hence, we took trace statistics results to ascertain that, the series are not cointegrated. The rationale as to why the import series are not cointegrated with the world GDP is as follows. Gross Domestic Product is the final value of all goods and services produced in the domestic territory of the nation. If we were to expand the definition to the world, Gross Domestic product of the world would refer to all the final value of goods and services which are produced in the world. Now, in our sample America is representative of developed Country whereas China is more or less developed country and India is an emerging economy which is classified under developing economy. The prominent exports and imports of these nations are summarized in Table 12. When we look into the imports and exports of these prominent economies, what we observe is that most of the imports of these economies are either raw materials or intermediary products which are used in the production of final products. When World Gross domestic product is estimated the value of most of the imports of these nations shall be subsumed in final products and hence imports in themselves shall not be directly associated with world GDP as most of the imports in themselves are not finished product. Hence in this backdrop, imports of these nations were not cointegrated with world GDP.

**Table 12.** Major imports and exports of America and prominent emerging economies

Country	Major Imports (in Billion \$)	Major Exports (in Billion \$)
United States	Crude Petroleum (\$ 123) Computers (\$ 81.9) Vehicle Parts (\$ 71.6) Cars (\$ 178)	Aircraft Parts (\$ 16.3) Refined Petroleum (\$ 84.9) Medical Instruments (\$ 29.5) Gas Turbines (\$ 28.1)
China	Integrated Circuits (\$ 123) Crude Petroleum (\$204) Iron Ore (\$ 83.1) Petroleum Gas (\$ 47.8) Copper (\$ 31.8)	Telephones (\$ 54.8) Computers (\$ 141) Integrated Circuits (\$ 108)
India	Crude Petroleum (\$39) Gold (\$33.8) Diamonds (\$ 22.5) Coal Briquettes (\$ 24.9)	Semiconductor Devices (\$ 34.8) Broadcasting equipment (\$208) Petroleum Products (\$ 39.2) Diamonds (\$ 22.5) Jewelry (\$ 14.1) Packaged Medicaments (\$ 15.8) Cars (\$ 7.15)

**Notes:** The above data (2019) has been compiled from The Observatory of Economic Complexity, a data visualization site for international trade data created by Macro Connections group at MIT Media Lab.

## Conclusions

From our empirical analysis, we could ascertain that the advent of pandemic has created shocks in American bilateral trade with emerging economies. The normal speed of adjustment in bilateral trade has been found to be proportional to the political and economic

interests that America has with the emerging economies in question. Given the contraction of world economy and obvious mutual benefits that America has with the world through international trade, America must resist the temptation of protectionism and set a positive example at global level by pursuing liberal trade policy and correct the shocks in its bilateral trade with emerging economies as fast as possible. Another significant finding from our empirical analysis is the role that these prominent economies have in assisting the World GDP to revert to mean. Our study tends to suggest that, exports of United States, though not statistically significant, can help in enabling world GDP to revert back to mean in the long run. Indian exports has been found to be statistically significant in helping the world economy to revert back to mean in the long run. Interestingly China's export may play a role in diverging the world GDP from reverting to normalcy. This may be attributed to two reasons. On one hand, China devaluing its currency by flouting the conventions of IMF, has resulted in China pushing its exports at the expense of other countries exports (Mercurio and Sze Ning Leung, 2009). Moreover, China's One Belt One Road initiative, which is China's attempt to push its exports is inadvertently pushing many countries into debt trap (John Hurley et al, 2021). Hence, in this context the major initiatives of China to push its export seems to have been at the expense of other countries. Thus, our paper is of the opinion that China should relook its development agenda in light of greater good. Even when we observe the short run dynamics, exports of India and United States were able to correct 72 and 78 percent of world GDP's deviation in short run. Thus, economies of United States and India have a significant role to play in assisting the world economy to revert to mean in the short run. We want to underline that our paper is not a rebuttal of the statement made by International Monetary Fund (The Print, 2021). It may very well be true that, China's economy may play a significant role in aiding world GDP to revert back to mean. However, if we were to analyze exports of these prominent countries, exports of India and United States has a positive role in aiding World GDP to revert to mean. On the other hand, China's policy initiative which seeks to push its exports at the expense of other countries economic stability (Mercurio and Sze Ning Leung, 2009) may be detrimental in assisting the world economy to revert to mean.

All in all, the intention of our paper is not to criticize any policy of any international actor. World economy has been adversely affected by subsequent waves of pandemic. Even before pandemic, most of the prominent economies of the world were leaning towards protectionism. In this backdrop, we wanted to point out the importance of international trade in assisting the World Gross Domestic Product to recover and flourish. Inferences from our study suggests that, in short run exports of major economies like United States and India have the potential of significantly correcting the world GDP. In this backdrop, it would be highly relevant for all world economies to not fall under the trap of protectionism in the name of protecting national interests at the cost of the world. All nations must understand that, for national interests to flourish, world must flourish. In this context creating a conducive environment for international trade is going to go a long way in achieving the said objective. It is in the interest of both United States and the world, for America to pursue and promote liberal trade practices. Being the most influential country in the world, it is up to United States to set the world in right trajectory.

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## Note

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\*Data is made available.

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