

The Impact of the Covid-19 Pandemic on Vietnam's Exports

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Abstracts: The COVID-19 pandemic outbreak expanded worldwide, disrupting trade on a scale never before seen, as well as that of individual nations, notably Vietnam. The complicated developments of the COVID-19 pandemic have significantly affected Vietnam's economic growth in general and export activities in particular. Since joining the WTO, Vietnam's exports have grown tremendously and become an essential driver of economic growth. However, due to the high openness of the economy, Vietnam's exports are highly dependent on impacts from external shocks with global influence, especially the Covid-19 pandemic. The following research paper uses a mixed regression model to analyze and assess the impact of the Covid-19 pandemic on Vietnam's export activities through such contents as export turnover, export product, export market, and exporters.

Keywords: Covid-19, Exports, Impact, Mixed Regression Model, Trade, Vietnam.

1. INTRODUCTION

Since implementing market economic reforms in 1986, Vietnam has transformed itself from one of the least developed countries to one of the world's fastest-growing and most dynamic economies. This success is mainly due to Vietnam's high degree of economic openness based on international trade. However, after joining the WTO, Vietnam's economy has faced many economic shocks, including the global financial crisis, the European recession, and Covid19. The World Bank and the International Monetary Fund have stated that the Covid-19 problem is the most serious since the Great Depression of 1929-1933, causing unprecedented negative impacts on the world economy and Vietnam. The Covid-19 pandemic caused a multi-dimensional shock on public health, jobs, domestic business activities, and frozen international trade. The pandemic has significantly impacted the trade and investment activities of countries worldwide. Social distancing in many countries causes a decline in the value of exports and imports of goods and services, accompanied by a decrease in income, a decrease in consumption, and a stagnation of import and export activities. The decline in world economic growth in some countries and territories that are Vietnam's major trading partners will directly impact the nation's trade. With the characteristic of being an export-driven country, the decline in global trade has significantly affected Vietnam's export activities, thereby affecting Vietnam's economic growth. These things pose the problem of needing to analyze and evaluate the impact of the Covid-19 shock on Vietnam's total export turnover as well as the impact of the shock on exports by product, by market, and by the exporter, thereby proposing some recommendations and solutions to promote Vietnam's export activities in the coming years.

2. LITERATURE REVIEW

Covid-19 is a pandemic of infectious diseases occurring globally, which has seriously devastated the overall economy and is the most significant economic and health shock in the past 35 years.

2.1. Impact of Covid-19 on economic activities

Covid-19 has been causing a huge global shock, and its effect on economic activities is indicated in the study by *Maliszewska M. et al. (2020)*. This study used a general equilibrium model that simulates the potential impact of Covid-19 on gross domestic product and global trade. The model showed that the shock has reduced production

inputs such as labor and capital, increased international trade costs significantly, and reduced tourism services and there is a diversion in activities that require human contact. However, this study did not fully assess the impact of the pandemic but only conveyed the magnitude of the impending global economic impact, especially for developing countries and their potential support needs.

The study of *Priya, M. S. et al. (2021)* again referred to the global pandemic created by Covid-19 that has affected the world economy. Global citizens have been forced to social distance by orders of governments in countries. The study used the interpretive structural model (ISM) to explain the hierarchical relationship between variables. The MICMAC modeling and analysis results indicated enormous spending on social security, rising unemployment, disaster prevention and relief funds, and emergency funds as the highest-ranking economic variables.

In the context of countries implementing measures such as quarantine and social isolation against the threat of Covid-19, some sectors of the economy were seriously affected, and many economic activities were hindered from development, especially retail. *Júnior, D. S. G. et al. (2022)* investigated strategies for disseminating, commercializing, and distributing goods during the Covid-19 pandemic, particularly concerning small companies not yet fully integrated with digital technology. The authors saw the combination of different technologies has aided small businesses during the pandemic, as commercialization of digital media is one of the leading solutions to prevent bankruptcy, especially for physical companies.

The negative impact of Covid-19 on economic and political stability in many countries, such as Indonesia, India, Japan, China, Vietnam, Thailand, and Muslim countries, is noted in the following studies:

Susilawati S. et al. (2020), with data taken from the Internet regarding the validity of information such as official government information, official online sites and processing results of valid data, the study indicated the impact of the Covid-19 pandemic affecting sectors of the economy in Indonesia including transport, tourism, trade, health, and others. However, the economic sector hardest hit by Covid-19 is the household.

Researches with the aim of assessing Covid-19 for micro, small, and medium enterprises (MSME) were conducted by *Sahoo, P., & Ashwani. (2020)* in India and *Al-Harbi, A. T., & Ahmad, M. U. (2023)* in Saudi Arabia. The impact of the pandemic on MSME sectors and under various full, prolonged, and partial lockdown scenarios, as well as at varying levels of capacity utilization, was significant for the Indian economy. The possible impact (deceleration) of Covid-19 from best-case to the worst-case scenario is as follows: the manufacturing sector may decline from 5.5 to 20%, exports from 13.7 to 20.8 %, imports from 17.3 to 25% and MSME net value added (NVA) in 2020 from 2.1 to 5.7% over the previous year. In Saudi Arabia, *Al-Harbi, A. T., & Ahmad, M. U. (2023)* based on a survey of MSME owners and managers was conducted (response rate 41%) by using a 33-item questionnaire to understand the impact of Covid-19 and subsequent government policy support on the earnings of MSMEs. Through linear regression and censorship analysis, the study showed that firm size and government economic support moderate the relationship between MSME activity and MSME earnings.

In Japan, *Ashari, H., & Nugrahanti, T. P. (2021)* studied the challenges of changing household psychosocial and socioeconomic behavior to meet daily needs during the Covid-19 pandemic lockdown in DKI Jakarta and surrounding cities/area. The study used a descriptive quantitative approach to explain socioeconomic and psychological behavioral changes. The results indicated that the desire to meet the needs of life and existence decreased during the Covid-19 pandemic.

Using financial data from listed Chinese companies, the study by *Shen H. et al. (2020)* analyzed the impact of Covid-19 on corporate performance. Research showed that Covid-19 has a negative impact on company performance. The negative impact of Covid-19 on company performance is more noticeable when the size of a company's investment or sales revenue is more diminutive.

Bui, D. et al. (2022) investigated the impact of information on cross-country ratings on government and public response to the Covid-19 pandemic on consumer expectations and sentiment for macroeconomics. The study

conducted consumer surveys using randomized controlled trials (RCTs) during two Covid-19 outbreaks in Thailand and Vietnam. In the first survey, conducted when the blockade order was first eased, the treatment effect was stronger than in Vietnam, making expectations and sentiment more optimistic. However, in the second survey, conducted at the beginning of the second wave of infections, the treatment effect was stronger in Thailand, causing a more pessimistic outlook.

The impact of oil prices, world uncertainty and pandemic uncertainty on Islamic stocks by sector (finance, healthcare, industry, oil and gas, technology sector, telecommunications sector, and utility sector) was pointed out in their research by *Meo, M. S. et al. (2022)*. The study also pointed out that the world oil price, the world's instability, and the world pandemic's instability index positively affect the technology and telecommunications sectors.

2.2. Impact of Covid on Trade in General And Export Activities In Particular

2.2.1. Impact on Trade

In addition to analyzing the impact of Covid-19 on economic activities in general, the researchers also focused on assessing the impact of this economic-health shock on global trade as well as on that of countries, specifically:

Kazunobu, H., & Hiroshi, M. (2020) presented initial evidence on the impact of Covid-19 on international trade, whereby the authors investigated trade activities between 186 countries in the first quarter of 2020. The results indicated that the burden of the pandemic (as measured by the number of cases and deaths) in exporting countries and in non-importing countries has a significant negative impact on trade. In addition, the negative impact of Covid-19 on exporters was seen in exports from developing countries rather than from developed countries. Moreover, the burden of the pandemic in the neighboring countries of an exporting country positively affected that country's exports.

The effect of the pandemic on the level of trade connectivity between countries was shown in the study of *Vidya, C. T. & Prabheesh, K. P. (2020)*. Using analysis of trade networks and Artificial Neural Networks, the study's findings showed that: (i) There has been a sharp decrease in commercial connectivity, connectivity and density between countries after the Covid-19 outbreak. (ii) There is an apparent change in the structure of the trade network (iii) China's 'central' position in the trade network has not been affected by the pandemic.

Using the most advanced trade gravity model, *Barbero, J. et al. (2021)* examined the impact of COVID-19 on bilateral trade flows. The study used monthly trade data of 68 countries exporting through 222 destinations from January 2019 to October 2020, and the results showed a more significant negative impact of Covid-19 on bilateral trade for those countries that were members of regional trade agreements before the pandemic.

How to study import and export strategies during the Covid-19 pandemic has become a big problem that many scholars need to solve urgently. Therefore, *Tang W. et al. (2022)* constructed a two-stage game model and used the inverse-solving approach to achieve the optimal output of importing country and exporting country firms before and after the outbreak of the pandemic, as well as the optimal subsidy for enterprises in the exporting country and the optimal import quarantine rate for the importing country. Results of the research showed that: enterprises in exporting countries face double risks from epidemics and import quarantine fees; the increase of import quarantine fee reduces the social welfare of the exporting country; to effectively control the spread of the pandemic, subsidies are an effective means of restoring exports to normal; The fact that importing countries charge reasonable import quarantine fees can promote bilateral trade, but the excessive collection will be counterproductive.

The outbreak of the COVID-19 pandemic spread around the world, causing unprecedented disruption to the world's trade in general and the commerce of countries in particular, in which China - the origin of the pandemic has been deeply affected. While *Cao L. et al. (2020)* provided a preliminary analysis of the impact of the Covid-19 pandemic on China's agricultural imports and exports from both a short-term and a long-term perspective, the study by *Zhang, Y. et al. (2021)* examined the pandemic challenges through observation of China's fish import and export.

Cao L. et al. (2020) analyzed the scenario that simulates the potential impacts for agricultural product import and export, indicating that China's agricultural exports will be negatively affected in the short term due to supply chain disruptions. The simulation results also showed that China's imports of pork products, due to Covid-19 and the implementation of the China-US Economic and Trade Agreement (SUETA), will most likely see a significant increase in volume but a smaller increase in value. For fish import and export, the results of the study by *Zhang Y. et al. (2021)* pointed to control measures to cope with uncertainty about the origin and transmission of diseases, the urgent need to limit the movement of people and goods, and concerns about a second wave of outbreaks that have significantly disrupted the fish trade.

Regarding the development trend and characteristics of China's foreign trade and FDI in the context of the epidemic, *Duan W. et al. (2020)* analyzed the general direction of changes to the structure of the domestic sector, the structure of the foreign market, the structure of import and export products, and the industrial distribution in foreign investment. and the situation among countries along the Belt and Road. From there, the authors proposed a number of countermeasures to promote China's foreign trade and FDI, such as establishing an early warning system for overseas risks, promoting the construction of facilities and cross-border e-commerce technology, etc.

With the issue of China's shipping trade, *Xu, L. et al. (2021)* used dynamic panel data models to estimate trends as well as investigate gaps occurring in the shipping trade between this country and different regions caused by the sudden outbreak of the pandemic, thereby providing helpful information for the operation management of the shipping industry. The results showed that the Chinese government's prevention and control measures have a negative impact on export trade, while import trade increases accordingly.

For other countries, *Minondo, A. (2021)* analyzed the impact of Covid-19 on trade in goods and services in Spain using monthly trade data at the product level, region and company. The precautions taken to prevent the spread of the virus have caused a severe drop in trade in services in Spain and could have a long-term negative impact. In New Zealand, *Nitsch, V. (2022)* studied the impact of the Covid-19 pandemic on international trade, which has systematically changed the mode of transport. Analyzing daily data from New Zealand, the study found an increase in the value of exports and imports by sea compared to shipments by air during the lockdown due to the pandemic.

2.2.2. Impact on Export Activities

China is a large export market in the region and the world, so when the Covid-19 pandemic occurred, the export activities of this market were significantly affected. *Friedt, F. L., & Zhang, K. (2020)* showed that Chinese exports are very sensitive to the severity of the global coronavirus outbreak. Besides, the study showed that all three shocks (domestic supply shock, international demand shock and impact of global value chain contagion (GVC)) contributed to the decrease in exports of China, but the spread of GVCs caused the greatest and most persistent effects to account for these losses. The study by *Zhao, Y. et al (2021)* also showed a significant negative impact of the Covid-19 pandemic in China and trading partner countries on Chinese exports by building an econometric model using pandemic data from China and 21 countries (regions) that are trading partners. Results showed (i) the pandemic in China had a significant negative impact on the country's export trade, (ii) the pandemic situation in the trading partner countries and regions has a significant positive impact on China's total exports, and (iii) the pandemic situation has a heterogeneous impact on China's total exports to various trading partners.

The Covid-19 pandemic has also had a statistically significant and negative impact on Mauritius' export trading system, with its five main export trading partners and sectors most affected (*Khan Jaffur, Z. et al, 2022*). In the study, the authors used time series data on monthly exports for the first half of 2020 (January 2020–June 2020) to analyze the cause and estimate the pandemic's impact on the island's export system. Although the impact in some cases was not clear during the study period, the results indicate that the pandemic will certainly affect total exports in the long run. However, this depends on measures taken locally and globally to mitigate the spread of the pandemic.

Regarding international seafood exports, particularly salmon, *Straume H. M. et al. (2022)* stated that Norwegian salmon exports were not significantly affected by the Covid-related measures. However, using company-level data

for all export locations to examine the impact of lockdowns in various importing countries in 2020, the study found that Covid-related lockdown measures significantly impacted trade patterns for four types of salmon products.

When experimenting in Vietnam, *Dong, C. V., & Truong, H. Q. (2022)* used monthly trade data from the General Department of Vietnam Customs and Poisson's assumed maximum likelihood (PPML) to investigate the impact of Covid-19 and the policy response to the pandemic on Vietnam's exports at the aggregate and sectoral levels over 33 months. During the first year of the pandemic (January–December 2020) as well as the entire study period (January 2019–September 2021), the pandemic burden of trading partners has adversely affected Vietnam's total export value, Vietnam's export losses due to the pandemic outweigh its export profits from the pandemic. In addition, the impact of the pandemic burden in Vietnam and in Vietnam's trading partners varies significantly across key sub-sectors. Also, in the first year, the government's response to the pandemic and its trading partners were positive for Vietnam's total exports, but over the entire study period, only positive impact from the Vietnamese government's response.

3. REGRESSION MODEL ASSESSING THE IMPACT OF THE COVID-19 SHOCK ON VIETNAM'S EXPORTS

3.1. Data

To assess the impact of the Covid-19 pandemic on Vietnam's exports, the study uses a monthly frequency data set with 86 observations collected from the General Statistics Office, General Department of Customs, State Bank of Vietnam, the Asian Development Bank for the period from January 2015 to February 2022.

The dataset includes variables: total export turnover of Vietnam; the export value of the following items: telephones, textiles, computers, machinery, and agricultural products; the export value of 5 major markets: the United States, China, Japan, Hong Kong, and Korea; the export value of domestic enterprises and FDI enterprises; interest rate; nominal exchange rate VND/USD and industrial production growth.

3.2. Regression Model

This study has developed the following mixed regression model with regression coefficients estimated by the OLS least squares method to determine the effect of the Covid-19 pandemic on Vietnam's total export turnover, export turnover by item, export turnover by market, and exporter.

- Model to analyze the impact of Covid-19 on Total export turnover:

$$\text{Log}(TOTALEX_{it}) = \beta_0 + \beta_1 EX_{it} + \beta_2 IR_{it} + \beta_3 IPG_{it} + \beta_4 COVID_{it} + U_t \quad (1)$$

- Model to analyze the impact of Covid-19 on export products:

$$Y_{it} = \alpha_0 + \alpha_1 EX_{it} + \alpha_2 IR_{it} + \alpha_3 IPG_{it} + \alpha_4 COVID_{it} + U_t \quad (2)$$

- Model to analyze the impact of Covid-19 on the export market:

$$Z_{it} = \gamma_0 + \gamma_1 EX_{it} + \gamma_2 IR_{it} + \gamma_3 IPG_{it} + \gamma_4 COVID_{it} + U_t \quad (3)$$

- Model to analyze the impact of Covid-19 on exporters:

$$T_{it} = \beta_0 + \beta_1 EX_{it} + \beta_2 IR_{it} + \beta_3 IPG_{it} + \beta_4 COVID_{it} + U_t \quad (4)$$

Where: $\beta_j, \alpha_j, \gamma_j$ with $j = \overline{0,4}$ is the coefficient in the model estimated by the least squares method.

- Dependent variables (unit: billion USD) include:

$TOTALEX_{it}$ is the total export turnover;

Y_{it} is the export value of an export item in the month i year t ;

Z_{it} is the value of export turnover of an export market in the month i year t ;

T_{it} is the value of export turnover of domestic enterprises or enterprises in the FDI sector at month i year t ;

- *The independent variables include:*

EX_{it} is the nominal exchange rate VND/USD of Vietnam at month i year t ;

IR_{it} is the interest rate (unit: %);

IPG_{it} is industrial production growth (unit: %);

$COVID_{it}$ is a dummy variable representing the Covid-19 pandemic shock and is conventionally $COVID_{it}=0$ if there is no Covid-19 epidemic in Vietnam at that time, and it equals $COVID_{it}=1$ if an epidemic occurs.

- *Random error:* U_t represents other factors affecting export turnover that have not been included in the model.

4. EMPIRICAL RESULTS

Table 1 presents the characteristics of the variables in the model (1):

Table 1: Characteristics of variables in the model (1)

	TOTALEX	EX	IR	IPG	COVID19
Medium	20.167	22769.83	5.744	7.965	0.302
Median	20.02	22767.97	6.25	8.35	0.0
Maximum value	34.592	23464.23	6.5	24.1	1.0
Minimum value	9.512	21335.20	4.0	-9.4	0.0
Standard deviation	5.453	489.759	0.996	6.064	0.462
Number of observations	86	86	86	86	86

The findings indicate that during the research period, Vietnam's total export turnover had an average monthly value of around 20.2 billion USD, with the lowest value being 9.5 billion USD and the maximum value being roughly 34.6 billion USD. With a standard variation from the average value of around 5.5 billion USD/month, the total monthly export turnover varies relatively high.

- **Analysis model of the impact of Covid-19 on Total export turnover**

Table 2: Estimation results of the model (1)

Variable	Coefficient
C	-37.428**
EX	0.004***
IR	-5.980***
IPG	0.109**
COVID19	-5.061***
R2	79%
ADJUSTED R2	78%
F-statistic	76.39***

Table 2 shows that the obtained model has a fairly high fit with the coefficient of determination of multiples of correction at 78%. The slope coefficients in the obtained model are all statistically significant, mostly at the 1% significance level. In which interest rates and the covid-19 pandemic have a negative impact. If the interest rate increases to 1% per month, the average total export turnover of Vietnam per month will decrease by about 5.9%. This is also relatively consistent in theory, and rising interest rates are a barrier for businesses, including those

producing export goods. This situation will make enterprises don't want to invest, reduce production or operate in moderation; then for exporters, the output will decrease, and the value of export turnover will also decrease significantly.

The results also show that Vietnam's average export turnover was reduced by about 5.06% when the Covid-19 pandemic took place, leading the negative impact of this pandemic on Vietnam's exports in particular and causing significant damage to the Vietnamese economy in general. Meanwhile, the exchange rate variable and industrial production growth have a positive impact, specifically in terms of other factors unchanged; when the nominal exchange rate VND/USD increases by 1 thousand VND/month, the total value of Vietnam's average export turnover a month increases by about 0.004%, and when the growth rate of industrial production increases by 1%/month, the average total export turnover of Vietnam increases by about 0.1%.

The authors also consider the defects of the model (1). The study uses the correlation coefficient matrix between the independent variables to test the phenomenon of multicollinearity, the Breusch-Godfrey test to check the autocorrelation phenomenon, and the White test to check the sensation of variance error change. The results show that model (1) has no defects.

Table 3: Matrix of correlation coefficients between independent variables

	EX	IR	IPG	COVID19
EX	1.000			
IR	-0.394	1.000		
IPG	-0.124	0.312	1.000	
COVID19	0.375	-0.640	-0.364	1.000

The values of the correlation coefficients between the independent variables are all less than 0.8, so the model does not have multicollinearity.

- **Analysis of the impact of Covid-19 on export products**

The information about exported goods is described in the following table:

Table 4: Characteristics of export value variables of each commodity

	Telephones	Computers	Machinery	Textiles	Agricultural Products
Medium	3.807	2.666	1.598	2.374	0.76
Median	3.662	2.52	1.352	2.355	0.746
Maximum value	6.097	5.302	4.298	3.615	1.027
Minimum value	1.725	0.942	0.468	1.215	0.369
Standard deviation	1.107	1.092	0.913	0.522	0.124
Number of observations	86	86	86	86	86

It can be seen that of the five export items, phones have the highest average export value of about 3.8 billion USD per month, the second is computers with approximately 2.7 billion USD, then textile products at 2.4 billion USD, machinery is about 1.6 billion USD and the lowest is agricultural products about 0.8 billion USD. Therefore, the export value of phones, computers and machinery has a large standard deviation from the average value of approximately 1-1.1 billion USD/month.

Table 5: Estimation results of the model (2)

Variable	Telephones (Coefficient)	Computers (Coefficient)	Machinery (Coefficient)	Textiles (Coefficient)	Agricultural Products (Coefficient)
C	-12.726**	-9.707***	1.796	-6.0559**	-0.423
EX	0.001***	0.0008***	0.0003***	0.0005***	0.00006**
IR	-0.892*	-1.042***	-1.012***	-0.4055***	-0.005
IPG	0.029*	0.0033	0.008	0.008646	0.0023
COVID19	-1.058*	-0.552**	-0.458**	-0.6195**	-0.074
R2	46%	88%	88%	38%	13%
ADJUSTED R2	43%	87%	87%	35%	9%
F-statistic	17.32***	144.2***	149***	12.6***	3**

***p<0.01; **p<0.05; *p<0.1

The results obtained in Table 5 show that the proposed model (2) for various export products is most suitable, the results of the test of conformity with the F-statistic have a significance level of 1%, but with for agricultural products, the model has a shallow fit at 13% and the independent variables included in the model are almost not statistically significant. Therefore, of the five products, only agricultural products are not affected by the Covid-19 pandemic. This can be explained that enterprises producing agricultural products for export do not depend much on the export supply chain and can be proactive in the supply of input materials, so during the Covid-19 pandemic occurs without a supply chain disruption like the rest, the impact of the Covid-19 pandemic on agricultural products is not obvious.

During the pandemic, the export value of phones, textiles, machinery, and computers was about 0.5 to 1 billion USD lower than that of the non-Covid-19 period. With these industries, the supply is interrupted when the pandemic occurs, making raw materials and labor force scarce. Once the number of products in these industries is quite limited due to the supply, the source of export goods also decreases significantly, negatively affecting the value of export turnover. Similarly, the nominal exchange rate and the interest rate both have an impact on the export value of these four commodities; however, the nominal exchange rate has a positive effect with a very small influence, while the interest rate has a negative effect with a much larger influence than the exchange rate. Industrial production growth had almost no impact on the export value of products.

The research was carried out on the Breusch-Godfrey test and the White test with the model (2), and the results show that model (2) has an autocorrelation phenomenon. However, the study does not use results to predict, so model (2) is still used to analyze the impact of independent variables on dependent variables.

- **Analysis model of the impact of Covid-19 on the export market**

The export market information is described in the following table:

Table 6: Statistical description of export markets

	United States	China	Japan	Korea	Hong Kong
Medium	4.741	3.154	1.483	1.397	0.689
Median	4.009	2.974	1.505	1.471	0.623
Maximum value	10.276	6.847	2.04	3.98	1.525
Minimum value	1.331	0.912	0.843	0.462	0.094
Standard deviation	2.045	1.388	0.265	0.499	0.227
Number of observations	86	86	86	86	86

The results in Table 6 show that the United States is the largest export market, and Hong Kong is the smallest export market of the five markets, with an average monthly export value of about 4.7 billion and 0.69 billion USD, respectively. China is a much larger export market in Asia than Japan and South Korea, with an export turnover of more than double. The export turnover value in Japan, South Korea, and Hong Kong markets is relatively stable, with standard deviations from the average value of about 0.25 - 0.5 billion USD/month. At the same time, the US is a much more volatile market with 2.05 billion USD/month.

Table 7: Estimation results of the model (3)

Variable	United States (Coefficient)	China (Coefficient)	Japan (Coefficient)	Korea (Coefficient)	Hong Kong (Coefficient)
C	2.634	-17.462***	-4.545***	-10.526***	2.312**
EX	0.0007***	0.0012***	0.00031***	0.0006***	0.000002
IR	-2.26***	-1.291***	-0.1884***	-0.173	-0.278***
IPG	0.021	0.0086	0.008**	0.006	0.0012
COVID19	-1.328*	-1.206**	-0.2406*	0.004	-0.2516**
R2	78%	69%	58%	60%	57%
ADJUSTED R2	77%	68%	56%	58%	55%
F-statistic	144.2***	45.38***	27.68**	12.6***	149***

***p<0.01; **p<0.05; *p<0.1

From Table 7, it can be seen that model (3) proposed for export markets is the most suitable; the test results with the F-statistic have a significance level of 1%, and the coefficient of determination of multiples is relatively high

from 58% above. However, for the Korean market, the independent variables included are almost not statistically significant, which means the Covid-19 pandemic has no impact on the value of Vietnam's export turnover to this market. The remaining four markets are all negatively affected by the Covid-19 pandemic

During the pandemic, the export turnover value to China, the United States, Hong Kong, and Japan was lower than in the period without Covid-19. The heavy impact of the Covid-19 pandemic on the global value chain can explain this. In particular, the central links of the chain are large countries with world-influenced economies, such as the United States, China, Japan, etc., which have been seriously affected by the spread of the pandemic. These are also major trading partners and potential export markets of Vietnam. Therefore, when these partners are affected by the Covid-19 pandemic, almost investment, trade and economic growth in the world as well as in Vietnam will be significantly reduced. The epidemic has reduced Vietnam's export turnover to China and the United States - the two largest export markets of Vietnam are about 1.2 to 1.3 billion, but with Hong Kong and Japan export turnover decreased slightly by 0.25 billion USD. Similar to exports, the nominal exchange rate and interest rate both have an impact on the export value of the four markets, but the nominal exchange rate has a positive impact with minimal influence, while interest rates have a negative effect with a much more significant impact than exchange rates. Industrial production growth primarily did not affect the value of export turnover to markets.

After considering the impact of the Covid-19 pandemic and some macroeconomic indicators on the total export turnover of 5 markets, the study continues to examine the model's defects (3). The results of model (3) do not have multicollinearity and variable variance but have autocorrelation defects like model (2).

- **Impact analysis model of Covid-19 by exporter**

Table 8 gives descriptive information about the exporter:

Table 8: Statistical description of exporters

	FDI Enterprises	Domestic Enterprises
Medium	14.292	5.875
Median	14.025	5.864
Maximum value	24.596	9.997
Minimum value	6.377	2.771
Standard deviation	4.103	1.434
Number of observations	86	86

Table 8 shows that enterprises in the FDI sector have a much higher proportion of exports than domestic enterprises, with an average export value of nearly three times per month; the FDI sector is 14.3 billion USD/month, while domestic enterprises are only about 5.9 billion USD/month. Correspondingly, the export turnover of FDI enterprises fluctuated wildly, with a high standard deviation from the average value of about 4.1 billion USD/month, while that of domestic enterprises was only about 1.43 billion USD/month.

Table 9: Estimation results of the model (4)

Variable	FDI Enterprises (Coefficient)	Domestic Enterprises (Coefficient)
C	-24.796**	-12.63**
EX	0.0028***	0.0012***
IR	-4.542***	-1.438***
IPG	0.0092***	0.017
COVID19	-3.555***	-1.506**
R2	82%	64%
ADJUSTED R2	81%	62%
F-statistic	90.6***	12.6***

Table 9 shows that the model (4) proposed for the factors affecting the export value of FDI enterprises and domestic enterprises is suitable, the test results with the F-statistic are significant at 1%, and the coefficients of determination are pretty high (82% and 64%). The independent variables included in the model are statistically significant. The model shows that the Covid-19 pandemic has a large and negative impact on the export activities of

FDI enterprises, twice as much as that of domestic enterprises. The epidemic has reduced the export value of FDI enterprises by an average of 3.6 billion USD/month and 1.5 billion USD/month for domestic enterprises. One of the important reasons for this problem is that Vietnam's export enterprises mainly outsource and focus primarily on enterprises in the FDI sector. When the Covid-19 pandemic broke the supply chain, the import of input materials for export by FDI enterprises was more affected than domestic enterprises, thus strongly affecting the export turnover of this exporter. Domestic enterprises also face many difficulties when maintaining production activities in the context of rapidly increasing production costs.

Similarly, interest rates have a negative impact on the value of export turnover of enterprises, and there is a significant difference in the influence of interest rates on export activities of enterprises in the two regions, in which the FDI sector is much more affected than the rest. The exchange rate positively impacts the export value of the two areas, but the effect is not large. Meanwhile, industrial production growth hardly affected the value of export turnover of enterprises in the two regions.

Checking the defects of model (4) by the methods mentioned above, the results show that model (4) does not have multicollinearity, there is no variable variance but the phenomenon occurs in autocorrelation.

Autocorrelation defects are pretty common in time series data models, and by taking hierarchical error 1 of the data series, the research team has overcome this defect in models (1), (2), (3), (4). Even if the models have autocorrelation, the coefficients estimated by the OLS method are still unbiased and robust estimates. Therefore, these coefficients are still good enough to evaluate the impact of the independent variables on the dependent variable. The autocorrelation only affects if we use the obtained model to make a forecast, but in this study, we do not use the model results to predict future export turnover growth.

In some models, there is a phenomenon of variable variance, which the research team has overcome by the general least squares method GLS. As a result, the coefficients obtained from the original model are unbiased estimates suitable for analyzing the effects of the independent variable on the dependent variable.

CONCLUSIONS AND RECOMMENDATIONS

The regression model has shown negative evidence of the Covid-19 shock to Vietnam's total export turnover in general and its effects on exports by item, market and exporter in particular. Thus, it is necessary to have timely policies to cope with the opposite effects of the Covid-19 shock on Vietnam's exports.

With Export Activities in General

Although Vietnam's export activities still maintain their growth momentum and trade surplus in the context of complicated developments of the Covid-19 epidemic, the level of export growth shows signs of slowing down and is not sustainable. Developing policies to improve export activities, ensure sustainable economic growth, social stability and improve people's welfare is necessary. Specifically:

- Improve the efficiency of implementing strategies, schemes and plans to invest in product development and create a sustainable supply for exports to cope with shocks in the coming time.
- Improve trade policies, regulations and standards for exported goods, expand markets and strengthen trade promotion.
- Completing investment, financial and credit policies to encourage exports and control imports.
- Upgrading transport infrastructure, warehouses, seaports, and developing logistics services.
- To raise the level of science and technology to develop high-quality human resources for a number of export-manufacturing industries.

With Export Products

Among the key export products of Vietnam, commodity groups such as phones and components; Textiles; Computers; electronic products and components; equipment, tools and spare parts are negatively impacted by Covid-19 with the value of export turnover decreasing, because these products rely heavily on export supply chains. Therefore, the Government needs to support policies for businesses to minimize difficulties in the supply chain, such as:

- Develop policies to support businesses in improving productivity to create products with competitive prices, minimizing dependence on imported raw materials.
- Formulate the enterprise's market development strategy for each product, ensuring the promotion of advantages and effective implementation of commitments in the bilateral, regional and multilateral FTAs that Vietnam participates in, especially the New generation FTAs.
- Actively source raw materials, and diversify sources of supply to avoid depending on the supply chain when the supply chain is interrupted.

Meanwhile, the group of agricultural, forestry and fishery products represented by agricultural products is an item that has not been affected much by the Covid-19 shock. Therefore, the Government needs to have policies to promote internal resources and promote the export of agricultural products.

- Agro-forestry-fishery exporters must improve their competitiveness and ensure quality, comply with standards to meet many markets and expand to new markets. Enterprises should take advantage of available raw materials and improve the quality of export products by building and upgrading processing enterprises, thereby boosting exports and increasing the value of export turnover for the country and creating more jobs and income for domestic workers.
- Enterprises also need to actively apply high technology and digital transformation technology from the stages of production, exchange, and consumption to fully exploit online commerce's potential for export.
- Diversify agricultural products processed for export, improve product quality and designs, research and develop new varieties, and apply biotechnology in the field of agricultural production.
- Building and actively promoting the image of Vietnam's agricultural exports associated with quality, safety and environmental friendliness in all stages of the supply chain of exported agricultural products.

With Export Markets

During the pandemic, the value of export turnover to Vietnam's key markets was lower than in the pre-Covid-19 period. In particular, the central links of the chain are large countries with world-influenced economies, such as the United States, China, Japan, etc., which have been seriously affected by the spread of the pandemic. Therefore:

- The Government needs to continue improving institutions, policies and business environment, creating conditions for implementing FTAs during the epidemic; create opportunities for businesses to learn about the market and approach partners.
- Promote marketing and export promotion activities based on market segmentation research, identify key and potential markets for the enterprise's export products, identify target import partners, and develop appropriate export marketing strategies and plans. Actively seek, expand and diversify export markets to new partners instead of traditional partners previously strongly affected by the pandemic, avoiding dependence on one market group.

With Exporters

The Covid-19 pandemic has had a tremendous and negative impact on the export activities of FDI enterprises, and this effect is much larger than that of domestic enterprises. Therefore:

- Focusing on improving domestic enterprises' ability, actively building enterprises' internal resources in terms of capital, material and technical foundations, and information technology.
- The Government needs to develop policies to encourage and support domestic enterprises to take advantage of opportunities from this pandemic to effectively use locally available input materials to support domestic enterprises to invest in science and technology.

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