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Pandemic pressures and trade resilience: Evidence from high-income countries

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Abstract:
This study aims to analyze the impact of inflation, military expenditure, industrial sector dynamics, and investment policies on international trade performance in High Income Countries (HICs) during the pandemic era (2018 to 2022) using panel data analysis. The Fixed Effects model reveals that inflation and industrial value added have a positive effect on trade openness, while military expenditure and foreign direct investment outflow negatively impact trade openness. In contrast, the share of labor in the industrial sector and foreign direct investment outflow do not show a significant influence. These findings suggest that maintaining inflation stability is essential to safeguarding the prices of essential goods, especially during crises such as the COVID-19 pandemic. Additionally, improving the performance of the industrial sector, both within the country and at the international level, is recommended. Higher industrial value added has been shown to significantly enhance trade openness. Policymakers in HICs should consider these factors to support more resilient and open international trade systems.

JEL: F10; F14; F21

Keywords:
FDI; inflation; industrial; military; high income countries

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1. Introduction

International trade is a crucial element in the economic structure of a country. Salvatore (2015) asserts that engaging in trade partnerships with other countries facilitates the integration of domestic production into the global market, thereby stimulating domestic production endeavors to fulfill the needs of international markets. This scenario is anticipated to increase the country's income through various means, including export tariffs, increased employment opportunities, and tax revenue from the employed population. (Din et al., 2020). International trade can also be used by both the public and the government to fulfill needs that cannot be produced domestically. By importing goods or services that are unavailable domestically, economic activities can continue, allowing every main aspect of life, particularly the economy, to operate more efficiently (Tridico, 2017).

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The tumult in the economy and international trade had to be contained due to the surge in the spread of Covid-19 at the end of 2019. The speed of the virus caused economic conditions worldwide to be threatened due to social restrictions imposed to curb its spread. The Covid-19 pandemic during that time resulted in the halt of numerous economic sectors, ultimately reducing production output and forcing companies to trim their workforce (Fetzer et al., 2021).

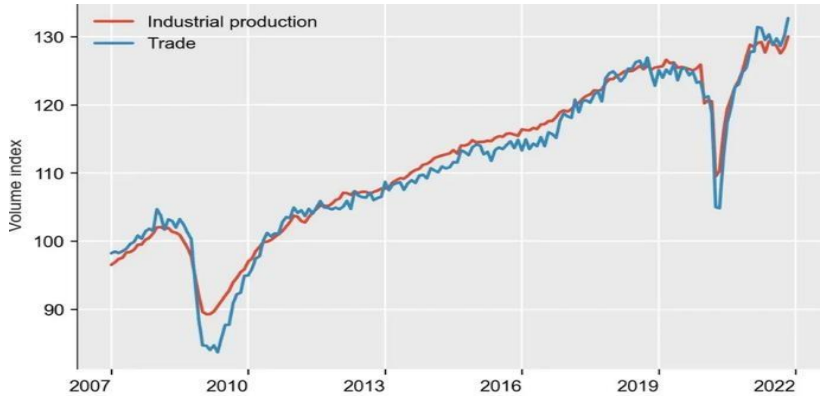

Figure 1. International Trade Volume and Output Production in the Industrial Sector (2010=100)
Source: United Nations Conference on Trade and Development

Figure 1 shows that in the year 2020, there was a significant decline in global trade and production volume. The Organisation for Economic Cooperation and Development (OECD) reported that in 2022, the global economy reached its lowest point since World War II amid the outbreak of Covid-19. However, the recovery of international trade volume significantly rebounded as solutions for addressing the pandemic began to emerge. Eventually, by 2021-2022, the volume of international trade returned to pre pandemic levels, when the pandemic had not yet spread. According to the United Nations Conference on Trade and Development (UNCTAD) data, during the year 2020, overall, the value of services exports from High Income Countries declined by -16.7%, twice as much as the -8.2% decrease in the value of goods exports. This situation clearly demonstrates the significant impact of the economic crisis due to the Covid-19 pandemic on international trade performance.

The spread of the Covid-19 pandemic has created turmoil and threatened global economic stability. Many workers were furloughed and became newly unemployed, resulting in a loss of livelihoods. This situation poses a significant threat to international trade activities because of changes in consumer patterns and reduced economic outputs. Moreover, social restrictions led to panic buying, causing an increase in essential commodity prices (Yoshizaki et al., 2020). Covid-19 has hindered the pace of the global economy, resulting in increased unemployment and inflation. Among the most affected sectors during the pandemic is the industrial sector. This sector heavily relies on labor for production activities, and during the pandemic, all activities were restricted because social distancing is enforced, ultimately decreasing output and the industrial value added (Aigbavboa et al., 2022). The global economic crisis and health emergency will undoubtedly affect economic activities. This becomes a major challenge for affluent nations in formulating strategies if they face future crises. Lopez & Adair (2019) state that a country's high international trade activities are in line with its high national income or GDP.

International trade is utilized for cooperation and enhancing economic transfers such as financing and Foreign Direct Investment (FDI) (Khobai & Mavikela, 2017). Policies regarding investment activities significantly impact a country's income sources. Mishkin (2012) explains that investment serves as a guarantee for a healthy economy and a capital resource for every production activity. High Income countries no longer rely primarily on domestic production as their main income source (Brell et al., 2020). For High Income Countries, investment activities are a primary focus in building their economies. According to Kuznet cited in Sanusi et al. (2019), advanced nations tend to actively invest in developing countries to relocate their production processes, aiming for cost efficiency. Additionally, labor costs in developing countries tend to be lower, reducing production expenses. This indirectly enhances economic relations with partner countries that receive capital injections, thereby increasing economic trade between them (Fahad et al., 2021).

Investment serves as a benchmark for every economy in every country. The high or low flow of investment can be an indicator of a country's income. Moreover, investment can influence international

trade through economic progress built from proficient investment activities (Qamruzzaman, 2023). The foreign direct investment activities carried out by High Income Countries in other nations can also occur in military cooperation. Military cooperation with economic partner countries aims to establish sustainable economic cooperation (Korolev, 2019).

A robust security and military system can also provide assurance for foreign investors to inject capital. Mishra (2019) reveals that investments require this security assurance to ensure investment continuity and economic stability. Hence, an increase in government expenditure can boost investor confidence and uplift the economy. In essence, increased investment can drive the economy and enhance trade openness (Dunne & Smith, 2020).

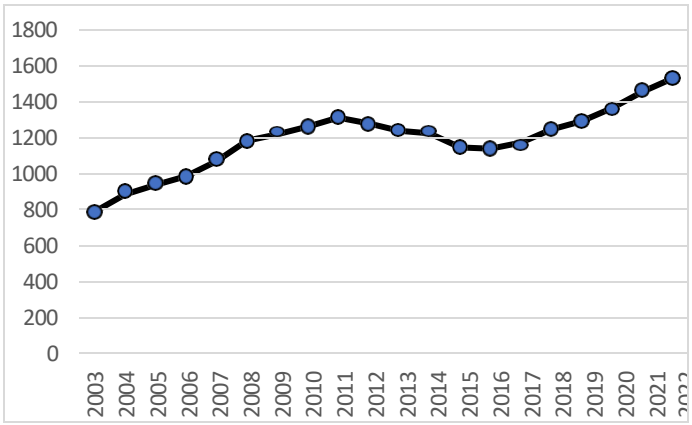

Figure 1. Military expenditure in HICs (Billion USD)
Source: Stockholm International Peace Research Institute (2023)

Figure 2 indicates a trend of increased military expenditure in High Income countries during the period 2003-2022. This trend reinforces the inclination to bolster domestic resilience and enhance their military capabilities. Ziadah (2019) reveals that military strength represents an implication of a nation's sovereignty. When a nation's military spending is high, its defense system and military assets are relatively secure, ensuring stable economic activities and minimal external threats.

White (2020) notes that high military spending also signifies a nation's provision of military aid to allied countries. For instance, the active involvement of the United States in deploying its troops to assist in resolving conflicts in its allied nations indirectly impacts positive economic cooperation and trade with those allied countries. Rahman & Siddiqui (2019) found in their research that military expenditures in 85 countries from 1998 to 2017 negatively affected the value or volume of international trade due to consuming a significant portion of the national budget. In their research, Li et al. (2023) discovered that between 1995 and 2015, new member countries of the North Atlantic Treaty Organization (NATO) experienced an upsurge in their export activities. This phenomenon was further supported by an increase in bilateral cooperation among NATO members. This underscores that military cooperation can enhance trade openness by reducing trade policy barriers and fostering mutual trust among NATO members.

The Covid-19 pandemic has weakened various economic sectors and reduced inter-national trade. Hayakawa & Mukunoki (2021) found that since July 2020, international trade activities in products across various industries, except for the medical goods industry, experienced a significant decline. Companies also had to implement internal efficiency measures by cutting their employees' wages, thus impacting a decrease in wage levels due to the pandemic. During the period from 1989 to 2019 in Indonesia, Silalahi et al. (2021) found that in the short term, inflation had a negative impact on the total volume of exports and economic trade. Meanwhile, in the long run, inflation proved to have a positive effect on export activities and economic openness. Another research outcome mentioned that inflation had no influence on Turkey's trade openness from 1980 to 2011 (Atabay, 2016).

Nulambe & Cinar (2018), using panel data regression and the Random Effects approach, found that FDI has a positive influence on the volume of international trade, while inflation has a negative impact

on total international trade in 34 Sub-Saharan African countries during the period of 2006-2015. Meanwhile, Mudiyanselage et al. (2021) found that the inflow of FDI into Romania during the period of 1997-2019 had a positive effect on the performance of the country's international trade openness.

Bharati et al. (2023) found that government spending, including expenditure on health, education, and military, had a positive impact on the trade openness of OECD countries from 2000 to 2016. Another study indicated that military expenditure positively affected economic growth through increased international trade activities among individual countries in 104 nations from 1988-2010 (Töngür & Elveren, 2017).

Aigbavboa et al. (2022) found in their study that many industrial sectors, including construction, in South Africa had to cease operations as the pandemic began spreading in the country. The imposed social restrictions resulted in a lack of income, negatively affecting the country's economic performance. Interestingly, Tiwari et al., (2021) found that advancements in information technology and the fourth industrial revolution created new opportunities for the economy and international trade in the service sector during the relentless spread of the pandemic. Based on the presented background, the researchers are interested in analyzing and measuring the economic challenges in the Covid-19 pandemic era and examining the strategies adopted by High Income Countries to face economic crises while maintaining high national income.

2. Data and Methodology

This study represents an analysis of international trade performance in 10 High Income Countries during the pandemic era (2018-2022). The selected countries for this study are the top 10 nations with the highest GDP globally during the research period (United States, United Kingdom, China, Japan, Germany, United Arab Emirates, France, Russia, Canada, and Italy).

The main objective of this research is to analyze the direction and magnitude of the impact of inflation, government spending in the military sector, industrial sectors, and investment policies on the international trade performance in High Income Countries in the pandemic era (2018-2022). The econometric model used in this study is an adaptation from the Banday et al. (2021) article with the following equation:

$$TO_{it} = \beta_0 + \beta_1 LOGIND_{it} + \beta_2 EMP_{it} + \beta_3 INF_{it} + \beta_4 LOGMIL_{it} + \beta_5 IN_{it} + \beta_6 OUT_{it} + \varepsilon_{it}$$

Where the degree of openness for each country is determined by the value of total exports added to total imports over GDP, then multiplied by 100%, expressing this variable in percentage units. The inflation rate is measured in percentage units, while military expenditure is denoted in US$. Meanwhile, the variables for FDI inflows and outflows are expressed in US$ units. The industrial sector is represented by the variable of industrial value added in US$ and the percentage of the workforce in the industrial sector. The study utilizes data derived from publications provided by the World Bank, Stockholm International Peace Research Institute, and United Nations Conference on Trade and Development.

The panel data regressions in this study follow a sequence comprising three primary testing models: Common Effects Model (CEM), Fixed Effects Model (FEM), and Random Effects Model (REM). Following this, model selection tests will be performed employing both the Chow Test and the Hausman Test. Once the most suitable estimated model is determined, a goodness of fit test will be carried out using the F-test. This involves interpreting the coefficient of determination and assessing the validity of influence through the t-test.

3. Result and Discussion

The results of the panel data regression estimation are presented in Table 1. The prob. statistical of F is 0.0000 (< 0.01), indicating that the Fixed Effects is superior to the Common Effects. With a statistical probability of χ^2 at 0.000 (< 0.01), it can be concluded that the best estimated model is the Fixed Effects.

Table 1. Panel data regression

Variable	CEM		FEM		REM	
	Coefficient	**Prob.**	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**
C	244,3210	0,0137	-559,701	0,0934	64,4126	0,5131
INF	1,2605	0,1604	1,5018	0,0000	1,7021	0,0000
LOG(IND)	-3,1840	0,5388	28,3627	0,0209	5,4220	0,2856
LOG(MIL)	-9,9378	0,0252	-18,5871	0,0432	-15,9798	0,0009
EMP	0,0668	0,9121	1,6427	0,2210	0,6668	0,3286
IN	1,69E-15	0,0033	-5,07E-17	0,7223	2,47E-19	0,9986
OUT	1,94E-11	0,3787	-1,03E-11	0,0946	-7,94E-12	0,1776
R^2	0,5663		0,9831		0,5437	
Prob,(F-stat)	0,0000		0,0000		0,0000	

(1) Chow Test: Cross-section F (9,34) = 93,0803; Prob, F = 0,0000
(2) Hausman Test: Cross section random $\chi^2(6)$ = 30,4131; Prob, χ^2 = 0,0000

Source: Data (processed)

Table 2 indicates that the F probability has a value of 0.0000 < 0.01; hence, it can be concluded that inflation, industrial value-added, the percentage of workers in the industrial sector, government expenditure on the military, FDI inflows, and outflows collectively impact trade openness. The R-squared value is 0.983087, which means that 98.31% of the variation in trade openness can be explained by the variation in inflation, industrial value-added, workers in the industrial sector, government expenditure on the military, FDI inflows, and FDI outflows, while the remaining 1.69% is influenced by other variables outside the model.

Table 2. Fixed Effects Model Estimation Results

Variable	Coefficient	*Std. Error*	t-Statistics	Prob.
C	-559,7007	324,2232	-1,7263	0,0934
INF	1,5018	0,2462	6,1000	0,0000
LOG(IND)	28,3627	11,7069	2,4227	0,0209
LOG(MIL)	-18,5871	8,8492	-2,1004	0,0432
EMP	1,6427	1,3176	1,2467	0,2210
IN	-5,07E-17	1,41E-16	-0,358397	0,7223
OUT	-1,03E-11	5,99E-12	-1,719353	0,0946
R^2	0,9831			
Prob.(F-stat.)	0,0000			

Source: Data (processed)

The validity test (t-test) results of this study indicate that military expenditure, inflation, industrial value-added, and FDI outflows significantly influence trade openness. Conversely, FDI inflows and the percentage of workers in the industrial sector were found to have no impact on international trade and trade openness in the 10 High Income Countries during the period before and after the Covid-19 pandemic (2018-2022).

Table 3 shows the constants in 10 High Income Countries. It is noted that the country with the highest constant is France, recording a value of -528.012. This signifies that concerning the influence of inflation, industrial value-added, percentage of workers in the industrial sector, government expenditure in the military field, FDI inflows, and FDI outflows on trade openness, France tends to exhibit the highest degree of trade openness. Meanwhile, the lowest constant is attributed to China, standing at -611.887. This indicates that regarding the influence of inflation, industrial value-added, percentage of workers in the industrial sector, government expenditure in the military field, FDI inflows, and FDI outflows on trade openness, China tends to have the lowest degree of trade openness.

Table 3. Effects and Constants

Country	Effects	Constant
United States	-17,533	-577,234
United Kingdom	27,226	-532,475
China	-52,186	-611,887
Japan	-33,185	-592,886
Germany	21,954	-537,747
United Arab Emirates	-11,135	-570,836
France	31,689	-528,012
Russian	2,878	-556,822
Canada	19,688	-540,013
Italy	10,603	-549,098

Source: Data (processed)

The industrial value-added variable shows a positive coefficient, implying that it positively affects trade openness. With a coefficient of 28.36269, a 1% increase in industrial value-added leads to a 0.28% rise in trade openness. Additionally, inflation has a positive regression coefficient of 1.5018. Consequently, a 1% increase in inflation escalates trade openness by 1.50%. On the other hand, the military expenditure coefficient of -18.5871 indicates that a 1% increase in military spending reduces trade openness by 0.19%. FDI outflows exhibit a regression coefficient of 0.0000000000103. Thus, a $1 billion increase in FDI outflows results in a 0.01% decrease in trade openness.

During 2018-2022, inflation positively influenced the trade openness of the 10 High Income Countries. This suggests that maintaining a matured inflation rate during this period was crucial for public policymakers to ensure essential commodity prices did not soar excessively, enabling the population to afford these goods and thereby maintaining consumption levels. Matured inflation is pivotal in stimulating market demand to boost production output.

Phillips in Mishkin (2012) suggests that increased inflation prompts production activities as manufacturers seek increased profits due to the rise in prices. Consequently, they will increase their workforce to produce more goods or services, reducing unemployment and enabling individuals to earn wages to meet their daily needs. The research findings align with Chhabra & Alam (2020), showing a positive correlation between inflation and increased trade openness in India during the period 1974-2016. However, these results contradict the research by Nulambe & Cinar (2018), indicating that uncontrolled high inflation negatively affected trade openness in 34 Sub-Saharan African.

The t test results state that industrial value-added positively influenced trade openness in the 10 High Income Countries during 2018-2022. The increased industrial value-added is closely related to efficiency and income growth in the industrial sector. Consequently, production output will increase with high-quality products, significantly enhancing international trade, mainly through the export activities of High-Income Countries. These findings align with Tiwari et al. (2021), who found that during the pandemic, technology and information based creative industries were highly sought after globally to cope with social restrictions, ultimately enhancing international trade.

The advent of the pandemic has reverberated through the efficiency levels across multiple economic sectors. While the implemented efficiency measures have indeed demonstrated an upswing in the industrial value-added and international trade across the 10 High Income Countries, policies enacted during the pandemic period have led to a significant surge in new unemployment due to the imposition of social restrictions.

This aspect strongly underpins another key finding of this research, indicating that the percentage of workers in the industrial sector did not exert any influence on trade openness within the 10 High Income Countries during the pandemic era. These findings find resonance in the work of Aigbavboa et

al. (2022), affirming that the ongoing pandemic directly impacted the cessation of economic sector activities, consequently leading to a decline in production output and international trade.

According to the International Labour Organization, in 2020, the unemployment rate in High Income Countries reached 6.51%, signifying an almost 2% increase in new unemployment during the pandemic compared to the previous year. With increased unemployment, production output decreases. In other words, the quantity of goods or services available and traded on the international market is not significantly high.

The research indicates that Foreign Direct Investment (FDI) outflows negatively impact international trade in the 10 High Income Countries during the 2018-2022 pandemic period. These findings support the research of Nulambe & Cinar (2018) and Mudiyanselage et al. (2021), respectively indicating a positive impact of increased foreign investment on trade openness. Furthermore, the results reinforce the conclusion that FDI inflows did not influence trade openness. FDI inflows were observed not to affect the trade openness of the 10 High Income Countries during 2018-2020. This outcome arose due to the study's coverage of the Covid-19 pandemic period, significantly impacting economies worldwide. Numerous economic sectors closed production and trade activities, resulting in a drastic decrease in revenues from these sectors, ultimately affecting the Return On Investment (ROI).

The investment strategies of developed countries seemed to collapse suddenly as the Covid-19 pandemic began to spread. It should be noted that investment policies of High-Income countries abroad are of significant value and often involve national budgets. Hence, substantial investment values were anticipated to generate immediate ROI, subsequently boosting the economy. However, the Covid-19 altered these strategies, leading to reduced international trade activities due to the limited economic activities.

The validity test results indicated that military expenditure negatively influences the trade openness and international trade of the 10 High Income Countries from 2018-2022. Military spending is derived from the national budget, affecting national income. Increased military spending adds to the spending burden, hindering the economy and international trade. These results contradict the findings of Bharati et al. (2023) and Töngür & Elveren (2017), where both studies found a positive impact of military spending on trade openness.

This research supports Rahman & Siddiqui (2019), concluding that military spending negatively affects trade openness in 85 countries from 1998 to 2017. The reduced trade openness and international trade of the 10 High Income Countries during the pandemic due to high military expenditure also reflect heightened international political tensions. Global political tensions necessitate High Income Countries, which are also economic superpowers, to increase their military resilience and military spending.

Conflicts such as the India-Pakistan territorial dispute, which also involved British intervention, the Taiwan-China border tensions at the pandemic's onset, the declaration of war between Russia and Ukraine supported by the North Atlantic Treaty Organization, and the recent escalation in political turmoil between Palestine and Israel, fully supported by the United States, have increased global political tension.

The escalation of these tensions prompts High Income Countries to increase military spending to enhance preparedness against military threats or aggression. If war is declared, the losing party will bear significant losses and experience a substantial decline in the economy and national income. Additionally, increased military spending depletes budgets that could have been utilized to enhance economic productivity and international trade, particularly post pandemic economic recovery.

4. Conclusion

This The economic openness and international trade activities are crucial aspects for every country. The dynamics of international trade can also serve as an indicator of economic growth within a nation. Moreover, an increase in economic openness can offer additional income avenues for a country or its

populace. However, the Covid-19 pandemic posed a significant hurdle for every nation. Various socio-economic restrictions imposed practically halted almost every economic activity.

This study aims to analyze the influence of inflation, government spending in the military sector, the industrial sector, and foreign investment policies on the performance of international trade in High Income Countries during the pandemic period, specifically between 2018 and 2022. The analytical tool employed to estimate the trade performance of High-Income Countries during this period utilizes panel data analysis. The outcomes from the chosen model, namely Fixed Effects, indicate that inflation and industrial value-added have a positive influence on trade openness. On the other hand, government spending in the military sector and FDI outflows exhibit a negative impact on trade openness. Meanwhile, the percentage of workers in the industrial sector and FDI inflows do not significantly affect trade openness.

The findings of this research are expected to serve as considerations for governments worldwide in maintaining inflation stability to ensure basic commodity prices remain stable during challenging times such as the pandemic era. This is crucial to ensure that the public can afford prevailing prices without experiencing shortages in essential needs. The governments are encouraged to pay more attention to the performance of the industrial sector, both domestically and internationally. Particularly, given the high investments made by High Income Countries in other nations, it is hoped that this substantial investment can significantly contribute to enhancing industrial value. This is because the proven increase in industrial value-added during the pandemic has indeed shown a tangible increase in the international trade and openness of High-Income Countries.

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