



Disasters in Vietnam's Trade Partners and Vietnam's Exports

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Abstract: This paper examines disasters in countries that import from Vietnam and their effects on Vietnam's bilateral exports to those countries. Our paper uses a gravity model for trade and data from Direction of Trade Statistics (DOTS), now officially referred to as International Trade in Goods by Partner Country (IMTS), from the International Monetary Fund (IMF). The results show that the aggregate impact of disasters in Vietnam's partners is negatively related to Vietnam's exports. However, effects differ across countries, depending on per capita income in the import countries.

Keywords: Disasters; Vietnam Exports; Trade Partners; Gravity Model; International Trade.

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1. Introduction

Vietnam's trade is heavily concentrated in a few key partners, and disasters' impact in these countries can significantly affect its export flows. Table 1 lists Vietnam's top five export markets in 2025.

Table 1. Vietnam's Top Five Trade Partners in 2025

Trade Partner	Imports from Vietnam in 2025	Export share
The United States	\$201.3 billion	31.3% of total
China	\$98.1 billion	15.2%
Hong Kong	\$41.5 billion	6.5%.
South Korea	\$31.8 billion	4.9%
Japan	\$30.4 billion	4.7%

Other major partners include the Americas, the European Union, ASEAN, and the Middle East, with the next five economies in 2025 being Mexico, Germany, Taiwan, Canada, and the United Kingdom.

The determinants of trade volume changes in the presence of disasters are changes in demand due to changes in per capita income, supply chain disruption due to deteriorating infrastructure, and government response to disasters.

This paper examines disasters in the above 10 countries and their effects on Vietnam's bilateral exports to those countries. Using a gravity model for trade and data from Direction of Trade Statistics (DOTS), we find that the aggregate disaster losses in Vietnam's partners adversely affect Vietnam's exports. However, the effects differ across countries.

Section 2 discusses existing literature. Section 3 introduces the model and data. Section 4 analyzes the results. Section 5 suggests disaster responses and concludes.

2. Existing Research

The literature on trade is rich in topics and subject matter. Gassebner *et al.* (2010) examine the effects of major disasters on import and export flows using a gravity model across 170 countries from 1962 to 2004. The findings indicate that each additional disaster reduces imports by

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0.2% and exports by 0.1% on average. Although bilateral trade volumes appear persistent, the main factors influencing disaster impacts are the level of democracy and the affected country's geographic size. Less democratic and smaller countries experience greater losses following a catastrophe. In autocratic regimes, both exports and imports decline significantly. In contrast, while exports in democratic countries would have decreased by a similar margin, imports would have increased.

Hadri *et al.* (2019) analyze how different disaster types affected exports from 1979 to 2000. The paper is the first to compare in a quasi-systematic way the results across the two data sets at hand, the standard *EM-DAT* data and *GeoMet* data, a newly available data set based on geophysical and meteorological data (*European Economic Review*, 2013, 58, 18; *Journal of Development Economics*, 2014, 111, 92). They run a series of regressions, progressively accounting for product characteristics, country characteristics (size, level of development), and catastrophe intensity. When estimating all countries and all types of disasters, they do not find any statistical impact on exports. But when they focus on each country separately and on individual disaster types, there are negative effects, except for the effect of temperature changes, which is ambiguous. Except for temperature-related disasters, the results are consistent across both data sets, *EM-DAT* and *GeoMet*.

Hamano and Vermeulen (2020) examine the impact of natural disasters on port-level exports, focusing on how exports from one port respond to changes in export costs at neighboring ports. The authors extend the standard trade model with heterogeneous firms to a multiple-port framework in which exporting depends on port-specific local transportation costs, port-specific fixed export costs, and international bilateral trade costs. Their findings indicate that gravity distortion from firm heterogeneity depends on port-level comparative advantage and the subsequent substitution of exports across ports. Following the 2011 East Japan Earthquake, at least 40% of exports were redirected to other ports. The substitution effect is most pronounced in technology-intensive product categories, highlighting how supply chains and domestic trade costs interact.

Han and Lee (2025) evaluate the disruptive potential of disasters on global value chains (GVCs). Analysis of 62 countries from 2007 to 2020 indicates that a typical disaster reduces forward and backward linkages by at least 27% on average; However, more prolonged and intense disasters further weaken GVC linkages, with climate-related disasters being particularly disruptive due to their severity and frequency. The results show that developing countries' positions within GVC linkages and inadequate responses amplify these effects. The paper discusses policy

implications for enhancing the resilience of global production networks.

Regarding the gravity model, Tinbergen (1962) writes an equation in which imports of a country from another country depend on aggregate incomes of both countries, the distance between the two countries, and other related control variables. The empirical results of his and his contemporaries Poyhonen (1963) and Linneman (1966) showed that the gravity model fits the empirical data consistently well. Since then, the model has become a major workhorse in empirical studies in international trade and other fields such as geography.

A theoretical foundation for the gravity model was introduced by Anderson (1979), followed by Bergstrand (1985). This theoretical issue by deriving the gravity model as a reduced-form equation from a simple system of two simultaneous structural equations, i.e., import demand and export supply equations. In this paper, we equate imports from Vietnam's partners with exports from Vietnam to these countries.

3. Model and Data

3.1 Model

We write the export function as

$$X = AY_i^\beta E_{ij}^\gamma D_{ij}^\delta e^{\varepsilon_{ij}} \quad (A > 0; 0 < \beta < 1; \gamma < 0; \delta < 0) \quad (1)$$

where Y_j is country j 's income, D_{ij} is the distance from country i to country j , and E_{ij} is the exchange rate of country i relative to country j :

$$E_{ij} = E(i, j)/E(j, i) \quad (2)$$

Writing (1) in natural logarithms yields

$$\ln X_{ij} = \ln(A) + \beta \ln Y_i + \gamma \ln E_{ij} + \delta \ln D_{ij} + \varepsilon_{ij}. \quad (3)$$

Adding disaster losses (L) to (3) yields:

$$\ln X_{ij} = \alpha + \beta \ln Y_i + \gamma \ln E_{ij} + \delta \ln D_{ij} + \mu L + \varepsilon_{ij}. \quad (4)$$

We then estimate equation (4), which yields the disaster effect on exports from country i (in this case, Vietnam) to its partners (aggregate effect). Control variables include infrastructure (INF), investment in capital (CAP), and education (EDU). Generating country-specific interaction variables will yield an effect on each country relative to the base country.

3.2 Data

The trade dataset comes from International Trade in Goods by Partner Country (IMTS), provided by the

International Monetary Fund (IMF). To the best of our knowledge, this is the primary source for detailed merchandise trade data disaggregated by a country's primary trading partners.

The disaster dataset comes from the Emergency Events Database (EMDAT), which is maintained by the Centre for Research on the Epidemiology of Disasters (CRED). It contains detailed records of major disasters from 1900 to the present. It compiles data from sources such as UN agencies, NGOs, insurance companies, research institutes, and press agencies. Our dataset comprises data from 2000 to 2025 for the ten above countries. Datasets are divided by population to obtain per capita measures.

Disaster losses comprise mortality (MORT) and the number of people affected (AFFECT). Equation (4) is estimated separately for MORT and AFFECT. Datasets on exchange rates and GDP deflators are from the US Department of Agriculture. Other datasets are from the World Bank World Development Indicators (WDI).

4 Results

The preliminary tests show that there is no heteroskedasticity or serial effects. The Hausman test indicates that fixed effects are more appropriate than random effects. Modified Hausman tests also reveal no endogeneity, so we employ fixed-effects estimation for Equation (4).

Table 2 reports on the aggregate impact of disasters. The results show that disaster losses in the partners adversely affect Vietnam's exports.

Table 2. Aggregate Impact of Disaster Losses

Dependent Variable: Log of Export per Capita

Variable	MORT Model	p-value	AFFECT Model	p-value
L	-0.014**	0.032	-0.012**	0.025
Y	0.018**	0.042	0.013**	0.035
E	-0.013**	0.026	-.016***	0.003
D	-0.014*	0.097	-0.018**	0.045
CAP	0.024**	0.042	0.028**	0.037
INF	0.011***	0.008	0.013**	0.026
EDU	0.019**	0.039	0.018**	0.031
Adjusted R ²	0.565		0.521	
Sample Size	230		230	

Note: *, **, and *** indicate 10%, 5%, and 1% significance, respectively.

For example, the coefficient estimate for L in the MORT model is -0.014, implying a 1% increase in the mortality rate reduces exports by 1.4%. The interpretation of other variables is in the same manner.

Theoretically, exports from Vietnam to a country equal its imports from Vietnam. Empirically, these two values differ slightly due to measurement errors. Hence, it is better to focus on the direction of the effect rather than on its magnitude.

We then generate country variables using the US as the base group. The interactive variables are:

ChL= China*Losse

HL= Hongkong*Losses

KL= Korea*Losses

JL= k=Japan*Losses

ML= Mexico*Losses

GL= Germany*losses

TL= Taiwan*Losses

CaL= Canada,*Losses

UkL= United Kingdom*Losses

Table 3 reports the results for the benchmark variables. The coefficients for the other variables are as expected. The result for the US is the coefficient estimate for L. The magnitudes of other variables can be obtained by adding the coefficient estimate to coefficient for the US. For example, coefficient for L in MORT model is -0.009, implying 1% increase in mortality rate in the US reduces exports by 0.9%. For China, the coefficient estimate for ChL is -0.005 in MORT model, implying 1% increase in mortality rate in the US reduces exports by 1.4% (-0.009 – 0.005 = -0.014).

Again, it is better to focus on the direction of the effect rather than on its magnitude.

Table 3. Country-Specific Impact of Disaster Losses

Dependent Variable: Log of Export per Capita

Variable	MORT Model	p-value	AFFECT Model	p-value
L	-0.009**	0.027	-0.008**	0.028
Y	0.019**	0.041	0.015**	0.032
E	-0.012***	0.001	-.015**	0.013
D	-0.011**	0.039	-0.013***	0.002
ChL	-0.005**	0.047	-0.007**	0.032
HL	-0.002**	0.038	-0.001**	0.029
KL	-0.003**	0.035	-0.004**	0.028

JL	-0.005**	0.026	-0.006***	0.004
ML	-0.008**	0.046	-0.007**	0.024
GL	0.001***	0.007	0.002**	0.036
TL	-0.002**	0.029	-0.003**	0.031
CaL	-0.001***	0.009	-0.002**	0.034
UkL	-0.003**	0.031	-0.001***	0.008
Adjusted R ²	0.634		0.613	
Sample Size	221		221	

Note: *, **, and *** indicate 10%, 5%, and 1% significance, respectively.

The results show that effects differ across countries. It appears that lower-income countries caused more losses for Vietnam's exports than the higher-income ones. Since higher-income countries often have better infrastructure, this implies that improving public investment in infrastructure in partner countries reduces export losses from disasters.

5 Policy Implications and Conclusion

5.1 Policy Implications

Based on the estimation results, we suggest the following disaster responses for Vietnam to increase exports to the above partners.

- (1) Diversify export markets beyond the top ten partners to reduce concentration damage from disasters.
- (2) Strengthen regional trade agreements with other countries to access alternative markets.
- (3) Invest in logistics resilience and alternative shipping routes to strengthen infrastructure.
- (4) Monitor disaster risk in key partners and adjust production and inventory planning according to their specific risks.

5.2 Conclusion

This paper examines the impact of disaster losses in Vietnam's trade partners on Vietnam's exports. The losses affect the following areas:

- (1) Supply chain delays: Typhoons or floods can delay shipments, increase costs, and reduce export volumes.
- (2) Reduced demand: Conflicts or instability in host countries can lower import demand for Vietnam's

goods and so export from Vietnam, especially in electronics, machinery, and textiles

- (3) Port congestion: Natural disasters in major ports can bottleneck exports.
- (4) Sector-specific effects: Electronics and machinery exports are most vulnerable to port and logistics disruptions; textiles and garments are affected by both supply chain and demand-side shocks.

In summary, while Vietnam's exports are strong and growing, its dependence on a small set of partners implies that disasters in these countries can significantly affect Vietnam's export performance. The impact on Vietnam's imports from these countries is a different issue and is left for future research.

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