

# Measuring the impact of COVID-19 and government policy responses on trade flow: the case of ASEAN countries

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## Abstract

**Purpose** – This paper aims to quantify the impact of the COVID-19 pandemic on bilateral trade flows among 10 ASEAN countries from January 2020 to December 2022. It also evaluates the effectiveness of government policy responses and the moderating role of regional trade agreements (RTAs) in alleviating trade disruption.

**Design/methodology/approach** – Using monthly bilateral trade panel data, we employ the pseudo-Poisson maximum likelihood (PPML) estimator to estimate a gravity model of trade. The analysis incorporates COVID-19 severity, four distinct government response indices and interaction terms with RTAs to identify their effects on trade flows.

**Findings** – The results indicate that the COVID-19 pandemic significantly reduced trade flows among ASEAN nations. However, economic support measures exhibited a positive and significant moderating effect on trade, in contrast to other more restrictive responses. Furthermore, regional trade agreements were found to consistently enhance trade value and to strengthen the positive effects of economic support while mitigating the adverse impacts of containment policies. This suggests that RTAs not only promote trade but also serve as institutional buffers during global crises.

**JEL Classification** — F14, C54, D78, I18, O24

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**Research limitations/implications** – The analysis focuses on bilateral trade flows, potentially overlooking broader multilateral dynamics. Additionally, variations in the scope and enforcement of government policies across countries may not be fully captured due to data constraints.

**Originality/value** – This study provides empirical evidence on how targeted economic support and regional integration via RTAs can sustain trade during global shocks like COVID-19. It contributes to the literature by demonstrating the synergistic role of RTAs in amplifying the effectiveness of national policy responses and offering practical insights for enhancing economic resilience in emerging economies.

**Keywords** COVID-19 policy responses, Economic stability, Emerging economies, Regional trade agreement (RTA), Trade flow

**Paper type** Research article

## 1. Introduction

The pandemic has hit emerging economies hard, with income losses showing and worsening existing economic weaknesses (World Bank, 2022a, b). Economically, the COVID-19 pandemic has impacted countries around the world in various ways. These include the increase of unemployment, poverty, disruption in the supply chain and production leading to an increase in inflation, travel restrictions and lockdowns resulting in trade deficit inflation. The global economy has reached a point where economies are facing either an economic crisis or civil unrest. This is especially concerning for economies that rely heavily on exports, travel and leisure (Wasim *et al.*, 2022).

The impact of COVID-19 could significantly alter global trade patterns in terms of international trade. Firstly, a high COVID-19 burden in an exporting country can reduce production, leading to a lower export supply. Secondly, the pandemic affects importing countries as well, with decreased aggregate demand because individuals and households spend less and save more due to future uncertainties or income loss (Richard and Eiichi, 2020). Thirdly, a country's trade can be affected by the COVID-19 situation in its neighboring country. A drop in exports from one country can create opportunities for its neighbors, while a production shock in one nation can disrupt production in neighboring countries through supply chains (Hayakawa and Mukunoki, 2020). Fernandes (2020) notes that supply chain disruptions and the decline in global trade due to the pandemic put additional strain on countries reliant on foreign trade. Lukasz (2020) examines the pandemic's impact on international trade, both short- and long-term, suggesting that while there may be a short-term decline, long-term adjustments and structural changes will occur as businesses adapt to economic globalization.

ASEAN is selected as the target research area due to its significant reliance on trade and its vulnerability to global economic shocks, particularly the COVID-19 pandemic. As a region heavily reliant on exports, ASEAN's economies are deeply integrated with global supply chains. In 2021, ASEAN's regional economy was valued at USD 1.73 trillion, and intra-ASEAN trade accounted for approximately 20% of global trade value. This high level of economic integration makes ASEAN particularly susceptible to disruptions in global trade flow. The COVID-19 pandemic exacerbated these vulnerabilities, leading to severe economic consequences for ASEAN countries. Lockdowns, quarantines, and border closures disrupted supply chains, reduced consumer demand and hindered international trade. As a result, many households experienced significant income declines, and businesses, especially SMEs, faced challenges in maintaining operations.

Prior to COVID-19, ASEAN economies experienced a growth rate of 4.7% in 2019. However, in 2020, the region's economy shrank by 3.3%, marking its first contraction in 22 years. Travel, which accounted for 33% of ASEAN's total service exports in 2019, dropped significantly to 10.3% in 2020, a substantial decrease from previous years. To address the pandemic, the governments of member countries have implemented numerous measures and policies. These include school closures, travel bans, public gathering prohibitions, emergency education funding, social subsidies, tax reductions, health policies, fiscal measures, alternative methods of delivering social services, and various other steps to prevent the spread of the virus and mitigate its impact. These measures have remarkably affected trade flow among countries. So that, by focusing on ASEAN, this research aims to understand the specific impact of COVID-19 on a region that is highly dependent on trade and has experienced substantial economic

disruption. From there, lessons can be drawn on effective policy responses to maintain stability and economic growth in developing and emerging economies in Asia, especially on macroeconomic stability, business development and social well-being in the recovery from the COVID-19 pandemic and in the face of geopolitical turbulence and global shocks.

Recent studies show that COVID-19 negatively affected trade flows and disrupted global supply chains, causing supply and demand shocks. In response, many governments have reduced import barriers and controlled exports of essential goods. Studies using the gravity model with the pseudo-Poisson maximum likelihood (PPML) estimator highlight that health policies correlate positively with imports, while strict measures like school closures negatively affect exports. Countries with high COVID-19 death rates, like China and the US, saw declines in both imports and exports, while nations like Vietnam and Switzerland experienced export declines, though product diversity provided some resilience. In Africa, strict measures sharply reduced trade, underscoring the need for reforms to reduce trade barriers and aid recovery. This study focuses on ASEAN countries, which play a significant role in global trade, and combines the gravity model with COVID-19 government responses to highlight the importance of policy intervention.

The remainder of this paper is structured as follows: [Section 2](#) reviews recent studies and relevant models to explore the potential impacts of COVID-19 on trade. [Sections 3 and 4](#) outline our empirical framework and describe the sample used in our analysis. [Section 5](#) presents the results and discussion of our empirical estimation. Finally, [Section 6](#) concludes the paper by summarizing our findings and discussing their implications.

## 2. Conceptual framework and hypothesis development

### 2.1 *The role of regional trade agreements (RTAs) in trade governance and crisis resilience*

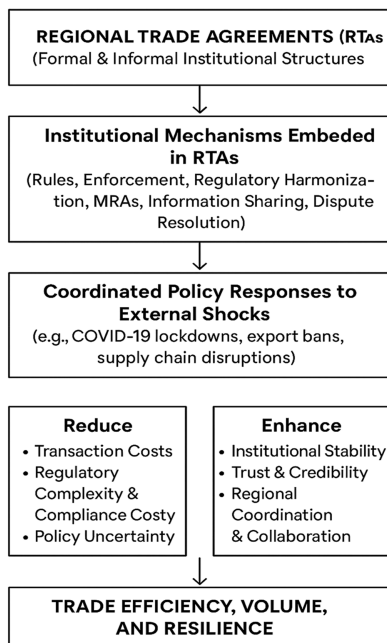
During the COVID-19 pandemic, regional trade agreements (RTAs) proved essential in maintaining trade flows and cushioning the disruptive effects of national policy responses like lockdowns and export restrictions. These measures significantly increased transaction costs for firms, especially in sourcing, certification and logistics ([Evenett et al., 2022](#)). However, RTAs equipped with institutional mechanisms—such as Mutual Recognition Agreements (MRAs), regulatory harmonization and information sharing protocols – effectively mitigated these frictions by enabling policy coordination and supply chain transparency ([FDA, 2024](#); [APEC, 2024](#)). [UNCTAD \(2020\)](#) estimates that regulatory cooperation under RTAs can reduce trade costs by over 25%, particularly for essential goods like medical products. Moreover, by establishing clear dispute resolution procedures and promoting transparency, RTAs helped prevent opportunistic protectionist behavior and reinforced trust among members ([World Bank, 2022a, b](#)). These mechanisms and their theoretical linkages are illustrated in [Figure 1](#).

The framework highlights the interaction between institutional structures and RTAs in enhancing trade efficiency and resilience, especially during external shocks. It emphasizes how both formal institutions (laws, regulations, RTAs) and informal ones (trust, norms) shape efficient trade conditions. RTAs implement mechanisms like rule-setting, enforcement and dispute resolution, which facilitate coordinated crisis responses and reduce trade frictions. The framework shows that RTAs lower transaction costs and policy uncertainty while boosting institutional stability and cross-border collaboration, leading to improved trade performance, higher volumes and stronger supply chain resilience. Hence, we come up with the first hypothesis:

*H1. RTAs enhanced trade resilience during the crisis.*

### 2.2 *Government policies as a shock mitigation during economic eruption*

Results from recent studies have shown that the COVID-19 pandemic has disrupted economic activities globally, which caused detrimental effects on international trade ([Nicita and Saygili, 2021](#); [Phan 2023](#); [Barbero et al., 2021](#); [Zhang et al. \(2022\)](#)). In addition, the pandemic induced widespread global supply chain disruptions, leading to both supply and demand shocks ([Obayelu](#)



**Figure 1.** Integrated institutional economics and RTA framework for trade and crisis response. Source: Figure created by the authors

*et al.*, 2021; Büchel *et al.*, 2020), and depression of the global economy (Onyeaka *et al.*, 2021). COVID-19 disrupts supply chains, increases transaction costs and leads to restrictions in trade, which negatively impacts trade flows, so we come up with the second hypothesis:

*H2.* The COVID-19 pandemic had a direct negative impact on bilateral trade flows among ASEAN countries.

To mitigate COVID-19's impact on trade, many governments implemented policies like reducing import barriers while restricting exports of essential goods and export restrictions. Numerous studies have examined the impact of government policy responses to COVID-19 on international trade flows. With regard to the policy response index, Barbero *et al.* (2021) use four key indicators mainly from the Oxford COVID-19 Government Response Tracker (OxCGRT), namely the stringency index (degree of lockdown policies), the containment and health index (lockdown measures combined with health policies such as testing and mask mandates), the economic support index (income support for the unemployed) and the overall government response index (all government responses to the pandemic). Similarly, Szabo *et al.* (2021) use stringency policies like school closures, stay-at-home requirements, and testing measures. The stringency index is also adopted by De Lucio *et al.* (2022) and Kejzar *et al.* (2022) to analyze policy responses.

Findings on the impact of these policies are mixed: economic support measures have shown positive effects by maintaining consumer purchasing power and business operations. In Vietnam, the government's response through strict measures, health measures combined with economic support and free trade agreements (FTAs) had a positive impact on Vietnam's exports. On the other hand, more stringent measures like school closures and stay-at-home orders are generally associated with negative impacts on exports and imports. Szabo *et al.* (2021), Barbero *et al.* (2021), and Brodzicki (2021) suggest that stringency, economic support, and containment and health measures are associated with decreases in exports. Similarly, Kejzar *et al.* (2022) report a negative association between the stringency index and total

exports, including intermediate goods, consumer goods and capital goods. Based on the current situation in ASEAN countries and government policies adopted during COVID-19, we use the Support Index, Stringent lockdown, Containment and Health as three indicators for government responses. Based on the panel data estimation results and the preceding arguments, the authors propose the third hypothesis:

*H3.* Government policy responses had positive effects on trade flow.

While existing literature extensively quantified the impact of COVID-19 on trade and evaluated government policy responses, there is a limited specific focus on the highly trade-dependent ASEAN region, particularly regarding the synergistic role of RTAs in combination with national policy responses. This study addresses this gap by providing empirical evidence for ASEAN countries, demonstrating how targeted economic support and regional integration via RTAs can sustain trade during global shocks like COVID-19.

**3. Data**

Our dataset comprises trade data from ten countries exporting globally between January 2020 and December 2022. Due to the monthly nature of the COVID-19 shock, we utilized monthly bilateral trade flow data sourced from UN Comtrade. This database, maintained by nearly 200 countries or regions, offers detailed import and export statistics dating back to 1962 and continuing to the present. With over a billion records, UN Comtrade stands as the most extensive trade database worldwide. Each entry includes details such as trade value in US dollars, shipment weight, and quantity of specific products exported or imported by each country. Based on the availability of monthly trade flow data for the selected countries, our analysis focuses on aggregate trade flows, with no missing data in the collected records. Data on government responses to COVID-19 was sourced from the Oxford COVID-19 Government Response Tracker (OxCGRT), created by the Blavatnik School of Government at Oxford University. This project compiles systematic data on policy measures implemented during 2020, 2021 and 2022 to combat the pandemic. The OxCGRT team continues to study the impacts and drivers of pandemic policies and collaborates with partners to develop rapid data collection methods for future global emergencies. Collected by over 1,500 volunteers and updated in real time, the dataset tracks variations in government actions and their effects on the pandemic and related outcomes. The indices include government response, health measures, stringency and economic policies, scored from 0 to 100, where higher scores indicate stronger measures. Since these data are recorded daily, we converted them into monthly averages for our analysis. Since these data are recorded daily, we converted them into monthly averages for our analysis. Additional variables are collected from various resources and presented in [Table 1](#):

The key descriptive statistics are summarized in [Table 2](#).

**Table 1.** Description of variables and their data sources

Variable	Data source
COVID: ratio of confirmed deaths to confirmed cases	Oxford Covid-19 Government Response Tracker (OxCGRT)
DIST: geographical distance	Centre d'Études Prospectives et d'Informations Internationales (CEPII) Gravity database
LANG: dummy variable for a common language	
COLONY: dummy variable for a past colonial linkage	
GDP: Gross Domestic Product	
POP: Population	
RTA: Regional Trade Agreement	
<b>Source(s):</b> Table created by the authors	

**Table 2.** Main variable descriptive statistics

Variable	Obs	Mean	Std. dev.	Min	Max	Pr (Skewness)	Pr (Kurtosis)
Exports (\$)	36,930	1.311e+11	7.016e+11	0.702	1.518e+13	0.12	0.58
COVID-19	36,924	1.039	1.007	0	8.527	0.87	0.31
Stringency index	36,930	23.585	9.741	0	100	0.23	0.88
Government response index	36,930	40.229	10.075	0	81.567	0.56	0.45
Containment and health index	36,930	39.284	8.785	0	82.566	0.91	0.61
Economic support index	36,930	46.842	42.457	0	100	0.34	0.94
Colony	36,930	0.003	0.058	0	1	0.78	0.11
Distance (in kilometers)	36,930	9449.935	4475.622	211	19,819	0.43	0.65
Common language	36,752	0.089	0.285	0	1	0.67	0.27
Regional trade agreement	36,930	0.226	0.418	0	1	0.15	0.49

**Source(s):** Table created by the authors

#### 4. Empirical strategy

Building on the conceptual framework and the research objectives outlined previously, this study aims to empirically test three central hypotheses regarding the impact of the COVID-19 pandemic on trade flows within ASEAN.

- (1) **Hypothesis 1 (H1):** RTAs enhanced trade resilience during the crisis.
- (2) **Hypothesis 2 (H2):** The COVID-19 pandemic had a direct negative impact on bilateral trade flows among ASEAN countries.
- (3) **Hypothesis 3 (H3):** Government policy responses had positive effects on trade flow.

The purpose of our empirical analysis is to examine whether COVID-19 has a causal effect on bilateral trade flows among ASEAN countries. Beyond assessing the positive roles of certain policy responses in alleviating the pandemic's impact, our study also aims to identify the limitations of these policies. Understanding these constraints is crucial, as they can significantly affect trade patterns. Therefore, our investigation focuses on distinguishing the short-term and long-term consequences of both supportive and restrictive measures, providing detailed insights into their complex influences on international trade dynamics. These findings may offer valuable guidance for post-pandemic economic recovery efforts. To achieve this, we employ a two-step approach. First, we assess the significance of the relationship between COVID-19 and export values within our ASEAN sample by applying a gravity model estimated via the Poisson pseudo-maximum likelihood method. Second, we extend this analysis by incorporating various policy response indicators, including the stringency index, economic support index, health index and overall government response index. Throughout all empirical tests, we control for trading characteristics of the countries involved, as well as potential omitted variable bias and reverse causality. In the initial step, we use the following specification of the gravity model to estimate COVID-19's impact on bilateral trade flows:

$$\begin{aligned}
 X_{ijt} = \exp\{ & \beta_1 \text{COVID}_{it} + \beta_2 \text{DIST}_{ij} + \beta_3 \text{LANG}_{ij} + \beta_4 \text{COLONY}_{ij} + \beta_5 \text{GDP}_{ijt} + \beta_6 \text{POP}_{ijt} \\
 & + \beta_7 \text{RTA}_{ijt} + \delta_i + \delta_t \} x_{ijt},
 \end{aligned}
 \tag{1}$$

where  $i$ ,  $j$  and  $t$  denote exporter, importer and time (monthly), respectively:

- (1)  $X_{ijt}$  represents the export values from country  $i$  to country  $j$  at time  $t$ .
- (2)  $COVID_{it}$  is the ratio of confirmed deaths to confirmed cases in the exporter country at time  $t$ , considered the COVID burden variable.
- (3)  $DIST_{ij}$  is the geographical distance between the exporter and importer countries.
- (4)  $LANG_{ij}$  is a dummy variable indicating if the exporter and importer share a common language.
- (5)  $COLONY_{ij}$  is a dummy variable taking the value 1 when exporter and importer country share past colonial linkages, and 0 otherwise.
- (6)  $GDP_{ijt}$  is the gross domestic products of exporter and importer country at time  $t$ .
- (7)  $POP_{ijt}$  is the population of exporter and importer country at time  $t$ .
- (8)  $RTA_{ijt}$  is a control variable taking the value 1 if the exporter and importer have a trade agreement in force before time  $t$ , and 0 otherwise, indicating the presence and nature of trade agreements.

The gravity equation is widely employed in international economics to forecast trade flows between countries, typically incorporating both export and import data. The core principle of this model is that trade volume increases with the economic size of the countries involved—commonly represented by GDP—and decreases with greater physical distance or other forms of trade barriers. In panel regression analysis, researchers may estimate the gravity equation using exports, imports, or a combination of both. The model was first introduced in trade analysis by Tinbergen (1962) and Pöyhönen (1963), and it has since become a standard tool in empirical studies of international trade. Beyond trade, it has also been effectively applied to other cross-border flows such as migration and foreign direct investment. The model typically explains exports from country  $i$  to country  $j$  through variables such as GDP or GNP, population sizes, bilateral geographic distance and institutional factors captured by dummy variables. Although initially lacking a solid theoretical foundation, the model gained substantial theoretical support from the late 1970s onward. The generalized gravity model of trade now expresses export flows  $X_{ij}$  as a function of national income levels, population sizes, geographic distances and selected institutional characteristics.

Besides the explanatory variables, we include control variables  $\delta_i$  and  $\delta_t$ , representing exporter and month fixed effects respectively, to account for biases from unobserved factors. The error term is denoted as  $\epsilon_{ijt}$ . All variables are expressed in logarithms except for dummy variables and percentages. A detailed description of all variables used in the empirical analysis is provided in Table 1 of the Appendix.

The inclusion of these variables is grounded in prior research and can be explained as follows: To examine the impact of the ongoing COVID-19 shock on trade, COVID-19-related variables are incorporated because they are expected to negatively affect trade flows. Government interventions are presumed to mitigate the duration and severity of the pandemic's impact, aiding the transition to a post-COVID-19 economy; however, such measures might also trigger short-term economic slowdowns due to restrictions and increased public spending. Geographical factors such as adjacency and distance are included because of their well-documented influence on trade patterns (Anderson and Yotov, 2010). Adjacency reflects the border effect, where countries are inclined to trade more with neighboring nations, resulting in higher trade volumes. Distance is traditionally included in gravity models, following foundational studies (Grossman and Friedman, 1964), since countries generally prefer trading with closer partners, leading to an expected negative coefficient. Common language is included to capture institutional effects on trade, as shared languages reduce transaction costs and facilitate commerce. Lastly, the growth of regional trade agreements

amid globalization and trade liberalization is recognized for its role in lowering trade costs and promoting trade (Carrère, 2006; Rodrik, 2018).

To analyze the effects of COVID-19 government response indices, we introduce Equation (2) as follows:

$$X_{ijt} = \exp(\beta_0 + \beta_1 \text{COVID}_{it} + \beta_2 \text{POLICY}_i \times \text{COVID}_{it} + \beta_3 \text{COLONY}_{ij} + \beta_4 \text{GDP}_{ijt} + \beta_5 \text{POP}_{ijt} + \beta_6 \text{RTA}_{ij} + \delta_t) \epsilon_{ijt} \quad (2)$$

Here,  $\text{POLICY}_i$  represents COVID-19 government response indices, which are assessed using four key indicators. The Stringency Index captures the level of lockdown measures implemented to curb the spread of the pandemic by restricting social interactions. It covers information on the closure of schools and universities, suspension of public transport and workplaces, cancellation of public events, limits on gatherings, restrictions on internal travel and stay-at-home directives. The Economic Support Index reflects government spending efforts, including income assistance for individuals who are unemployed or unable to work, household debt relief, fiscal policy interventions and financial support provided to other nations. The Containment and Health Index integrates lockdown measures with public health strategies, such as the coverage of testing for both symptomatic and asymptomatic individuals, the breadth of contact tracing efforts, requirements for wearing face coverings, and government investments in healthcare systems and vaccine development. The overall government response index aggregates all government responses to COVID-19, evaluating whether they have intensified or weakened over time. It includes all variables from both the containment and health index and the economic support index.

Traditionally, the basic gravity model has been estimated using ordinary least squares (OLS), a method commonly applied to various gravity specifications due to its intuitive appeal and theoretical simplicity. However, just as the foundational gravity model has faced growing theoretical critique, OLS has also come under scrutiny for its econometric limitations. To address these concerns, this study adopts the Pseudo-Poisson Maximum Likelihood (PPML) estimator for gravity model estimation. The increasing adoption of PPML in gravity-related research stems from its effectiveness in addressing heteroskedasticity when log-transforming trade data and its ability to handle zero trade values, which OLS cannot accommodate (Silva and Tenreyro, 2006).

PPML offers several advantages that make it particularly suitable for empirical policy analysis using gravity models. First, it remains consistent even with the inclusion of fixed effects, which can be implemented via dummy variables much like in OLS. This is a rare and valuable trait among nonlinear maximum likelihood estimators, which often struggle to perform reliably in the presence of fixed effects. This feature is crucial, as theoretical models of trade generally require fixed effects for both exporters and importers. Second, PPML naturally includes trade observations with zero values – common in international trade datasets where not all countries pairs engage in trade across all goods or services. These zero trade values are typically excluded from OLS models since taking the logarithm of zero is undefined, leading to potential sample selection bias. The ability of PPML to retain such data points without altering the model specification is a major advantage. Third, interpreting coefficients from PPML is straightforward and consistent with OLS interpretation. While the dependent variable in PPML is specified in levels (not logs), coefficients on log-transformed independent variables can still be interpreted as elasticities. Coefficients of variables in levels are treated as semi-elasticities, mirroring the interpretation under OLS.

In (1), we introduced importer fixed effects and time fixed effects to systematically examine the overarching impact of COVID-19 on ASEAN countries. This strategic inclusion allowed for meticulous control over uncontrollable and time-invariant variables linked to importing partners. Furthermore, the application of fixed effects facilitated a nuanced consideration of the dynamic trends characterizing the evolution of the COVID-19 pandemic

throughout the duration of the study. In (2), we systematically examined the interaction between the COVID-19 burden variable and the policy response index to assess the impact of these policies amid escalating COVID-19 burdens. Our methodology exclusively integrated time-fixed effects to account for temporal variations, enabling a discerning evaluation of the distinct effects of both the COVID-19 burden and policy measures at various time points. This analytical approach adheres to the conventions of academic research, emphasizing a rigorous investigation and meticulous control of pertinent variables. It aims to offer a nuanced understanding of the implications of COVID-19 and the corresponding policy responses.

Furthermore, to ensure the accuracy of our estimates, we conducted a unit root test (ADF and PP test) during the data analysis process. This statistical test helped ascertain the stationarity of the variables and ensured that the conclusions drawn from the analysis provided a robust basis for our study on the relationship between COVID-19 and bilateral trade flows of ASEAN countries. In terms of robustness analysis, we will conduct the Ramsey RESET test (Appendix Table 2), as it tests whether the assumption that the functional form of the model is correct. After generating the fitted values from the PPML model, we create squared and cubic terms of the fitted values. Next, we re-run the PPML regression, including the powers of the fitted values along with the fixed effects. The following step is to use the test command to check the significance of the squared and cubic terms. Besides, we also check the correlation between the COVID-19 variable and four government response indicators in Table 3 of the Appendix, and the multicollinearity test is also included in Table 4 of the Appendix.

## 5. Results and discussion

This section is separated into two subsections. First, we show the analysis of the benchmark, and then we present the main results, which are the indices of four different governmental policy responses regarding COVID-19.

### 5.1 Benchmark analysis

To test our first hypothesis (H2) and establish a baseline, this section analyzes the direct impact of the COVID-19 pandemic on trade flows using three specifications of the gravity equation. This section reviews three specifications of the gravity equation. The three columns in Table 1 include the COVID-19 variable, which refers to the confirmed deaths to confirmed case ratio from January 2020 to December 2022. This result departs from Equation (1), with Column (I) introducing exporter-month fixed effects, while Column (II) includes month fixed effects, and exporter fixed effects are presented in Column (III).

Across all specifications, the COVID-19 variable exhibited a significantly negative impact on trade. While the value of the COVID-19 coefficient in Column (II) is the largest ( $-0.0166$ ), the size decreases when we include exporter fixed effects. The COVID-19 pandemic has indeed cast a significant shadow over global trade, with emerging countries in ASEAN facing heightened challenges due to their reliance on exports. The disruption in international supply chains, travel restrictions and economic downturns have resulted in a more severe impact on trade flow for these nations.

These findings align with the broader global economic context during the pandemic. The World Trade Organization (WTO) mentions that the trade volume of global merchandise will reduce by 5.3% in 2020, marking a substantial decline. Within ASEAN, countries such as Viet Nam, Thailand and Malaysia, which depend heavily on exports, experienced a notable decline in trade activities. For instance, Viet Nam's exports contracted by 2.0% in 2020, highlighting the strain on these economies. The vulnerability of emerging ASEAN nations to external shocks emphasizes the need for resilient trade policies and diversification strategies to avoid the adverse effects of future global disruptions.

The figure for RTA is positive and significant at 1% in all three columns. This can be interpreted as an increase in trade value made by regional trade agreements among ASEAN

countries. De Soyres *et al.* (2019) also found that the increment in the trade as well as the declining inflows to the region are related to the RTAs. This can be interpreted as trade creation and trade diversion resulting from a shift in demand, driven by reduced trade barriers within the region and the application of rules of origin, which act as implicit trade barriers for imports from outside the region.

However, it is essential to note that the effectiveness of RTAs can be limited by various factors, including non-tariff barriers, infrastructure constraints and policy distortions; numerous landlocked nations impose restrictions on the very services that link them to global markets. According to Borchert *et al.* (2012), these restrictions tend to lead to more concentrated market structures and restricted access to services in these countries, even when considering factors such as geography, income levels and the potential endogeneity of policy. Similar policies in both industrial and developing nations also hinder competition in international transport services. Consequently, “trade-facilitating” investments under various “aid-for-trade” initiatives are likely to yield low returns unless they are paired with substantial reforms. By understanding the complex interplay between global shocks, regional integration and domestic policies, policymakers can develop strategies to enhance trade resilience and promote sustainable economic growth in the post-pandemic era.

Table 3 shows that the remaining variables exhibit the predicted coefficients based on theoretical understanding and gravity model forecasts. The figure for the common language coefficient might be contrary to previous findings on the impact of the common official language variable on the value of trade. This can be explained by the fact that the number of countries that share the same official language accounts for a small percentage among the observed countries. Among the remaining geographical and historical variables, all except for

**Table 3.** Robustness of gravity model using PPML

	(I) Log of trade value	(II) Log of trade value	(III) Log of trade value
COVID-19	−0.0152*** (−23.49)	−0.0166*** (−23.81)	−0.0136*** (−21.32)
Log of distance	−0.213*** (−34.49)	−0.0649*** (−32.75)	−0.220*** (−35.42)
Common language	−0.157*** (−35.30)	−0.0867*** (−22.69)	−0.160*** (−35.77)
Colony	0.0439** (2.99)	0.0327* (2.26)	0.0414** (2.85)
Log of exporter GDP	0.215*** (149.90)	0.197*** (144.18)	0.212*** (148.95)
Log of importer GDP	0.158*** (4.07)	0.0637*** (63.81)	−0.411*** (−15.60)
Log of exporter population	−0.0964*** (−86.04)	−0.0855*** (−78.66)	−0.0967*** (−86.93)
Log of importer population	0 (.)	−0.00840*** (−8.09)	0 (.)
RTA	0.0351*** (7.48)	0.0661*** (18.85)	0.0305*** (6.58)
Constant	−3.155** (−3.18)	−1.651*** (−42.14)	11.48*** (17.09)
Exporter controls	Yes	No	Yes
Time controls	Yes	Yes	No
Observations	29,995	29,995	29,995
Pseudo R <sup>2</sup>	0.1426	0.1255	0.1398

**Note(s):** t-statistics in parentheses. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

**Source(s):** Table created by the authors

the common colony dummy have positive coefficients as expected and are statistically significant at the 5% level or better, regardless of the fixed effects included. This finding is aligned with previous studies on the impact of colonialism on trade. Kleinman is widely regarded as the first to directly address how colonialism influenced trade. In his 1976 study, he examined how gaining independence affected trade patterns and how colonial influence declined between 1960 and 1970. To investigate the commonly held belief that colonization led to trade dominance, Kleinman assessed the portion of total trade by former colonial powers that came from their previous colonies. He found that independence led to a sharp reduction in trade dependence, although some level of dependence still remained by 1970.

### 5.2 Policy responses to COVID-19

In this section, we test our hypothesis (H3) by employing Equation (2) to assess the moderating effects of four distinct government policy responses on trade flows. As shown in Table 4, the impact of COVID-19 on trade is consistently negative and statistically significant across all specifications. These findings corroborate previous research (e.g. Espitia *et al.*, 2022) that highlights the adverse effects of COVID-19 on trade flows.

To delve deeper into the role of government policy responses, we interact the COVID-19 variable with four indices representing specific policy measures. Notably, only the economic support index demonstrates a positive impact on trade flow. This suggests that while other

**Table 4.** Results by PPML estimation using COVID-19 government response indicator

	(I) Log of trade value	(II) Log of trade value	(III) Log of trade value	(IV) Log of trade value
COVID-19	-0.00629*** (-7.66)	-0.00983*** (-10.85)	-0.0203*** (-21.29)	-0.0184*** (-18.90)
Colony	0.0909*** (5.65)	0.0920*** (5.73)	0.0901*** (5.69)	0.0901*** (5.61)
Log of exporter GDP	0.176*** (127.41)	0.174*** (123.95)	0.181*** (137.28)	0.172*** (121.52)
Log of importer GDP	0.0565*** (57.29)	0.0565*** (57.39)	0.0561*** (56.81)	0.0566*** (57.85)
Log of exporter population	-0.0615*** (-53.84)	-0.0579*** (-48.05)	-0.0805*** (-70.87)	-0.0535*** (-44.51)
Log of importer population	-0.000328 (-0.32)	-0.000348 (-0.34)	-0.000349 (-0.34)	-0.000380 (-0.37)
RTA	0.124*** (42.15)	0.123*** (41.71)	0.129*** (43.19)	0.123*** (42.01)
Stringency*COVID-19	-0.000673*** (-28.14)			
Government response*COVID-19		-0.000904*** (-29.11)		
Economic support*COVID-19			0.000493*** (19.19)	
Containment and health*COVID-19				-0.00108*** (-35.86)
Constant	-2.051*** (-50.92)	-2.038*** (-50.36)	-1.896*** (-48.72)	-2.057*** (-50.77)
Observations	30,109	30,109	30,109	30,109
Pseudo R <sup>2</sup>	0.1225	0.1226	0.1212	0.1243

**Note(s):** *t*-statistics in parentheses. \**p* < 0.05, \*\**p* < 0.01, \*\*\**p* < 0.001. All specifications are controlled for month fixed effect

**Source(s):** Table created by the authors

policy responses, such as stringent lockdowns and containment measures, may have hindered trade, economic support measures, like income support and debt relief, may have played a crucial role in mitigating these negative effects.

The stringency index, encompassing lockdown measures, business closures and restrictions on public transport, likely disrupted supply chains and reduced demand for imported goods, thereby hindering trade flow. Similarly, the containment and health index, focusing on contact restrictions and travel limitations, could have impeded both imports and exports by limiting production and consumption activities.

The overall government response index, which combines these restrictive measures, further strengthens the argument that broad-based government responses, while necessary for public health, have had a negative impact on trade flow. In contrast, economic support measures may have helped maintain consumer spending power, potentially offsetting some of the decline in trade caused by social distancing and other limitations. By bolstering businesses, these measures could have enabled them to weather the storm and sustain their import and export activities to a certain extent. Moreover, countries with higher scores on the economic support index may have been perceived as more resilient and reliable trading partners, fostering trust and mitigating uncertainties in global trade networks.

Overall, the impact of COVID-19 government policy responses on trade flows has been mixed. While some policies, such as economic support measures, have had a positive impact, others, particularly those aimed at containment and mitigation, have hindered trade.

These findings highlight the complex trade-off between public health and economic considerations. The policies designed to curb the spread of the virus, such as lockdowns and travel restrictions, have inevitably disrupted international trade. While essential for protecting public health, these measures have led to supply chain disruptions, reduced consumer demand and increased costs for businesses. This underscores the importance of a balanced approach that prioritizes both health and economic objectives. Policymakers must carefully navigate the delicate balance between implementing necessary health measures and ensuring the continued flow of trade to support economic stability.

As we move forward, it is crucial to learn from the lessons of the COVID-19 pandemic to develop strategies that can better align health objectives with economic resilience. This may involve exploring innovative approaches to minimize the negative impact of future crises on trade, such as digital solutions for remote work and virtual trade, and strengthening international cooperation to facilitate cross-border trade. By carefully considering the potential trade-offs and adopting a holistic approach, policymakers can strive to create a more resilient and sustainable global economy.

We also observe that the results remain relatively consistent across the different RTA variables, with values ranging from 0.123 for government response and containment and health measures to 0.129 for economic support. Although these estimated coefficients are not statistically significantly different from one another, the findings may still suggest that RTAs had a positive impact even during the COVID-19 period. As disruptions caused by the pandemic affect the global supply chain, countries participating in regional trade agreements exhibit greater resilience in their trade flows than those not engaged in such agreements. By fostering regional economic integration and collaboration, RTAs create a framework that mitigates the adverse effects of global supply chain disruptions. Countries engaged in RTAs often experience enhanced trade resilience, as the agreements facilitate smoother coordination, reduced trade barriers and streamlined processes, thereby insulating member nations from the worst impacts of external shocks. Consequently, advocating and supporting RTA policies during the COVID-19 period can emerge as a pragmatic approach for nations seeking to fortify their economies and maintain a more robust and adaptable position within the evolving global trade landscape.

Finally, to test our hypothesis (H1), we explore the role of RTAs as institutional buffers by interacting the RTA variable with the four government policy response indices. Table 5 indicates that the presence of Regional Trade Agreements (RTA) interacting with various government

**Table 5.** Results by PPML estimation interacting COVID-19 government response indicator with FTA

	(I) Log of trade value	(II) Log of trade value	(III) Log of trade value	(IV) Log of trade value
COVID-19	−0.0170*** (−24.37)	−0.0171*** (−24.47)	−0.0176*** (−24.18)	−0.0170*** (−24.48)
Log of exporter GDP	0.183*** (137.16)	0.179*** (131.45)	0.182*** (127.35)	0.180*** (133.59)
Log of importer GDP	0.0585*** (60.06)	0.0574*** (57.87)	0.0651*** (64.54)	0.0570*** (57.81)
Log of exporter population	−0.0791*** (−76.26)	−0.0749*** (−70.00)	−0.0779*** (−65.57)	−0.0761*** (−72.47)
Log of importer population	−0.00159 (−1.53)	−0.000451 (−0.43)	−0.00315** (−2.95)	−0.000469 (−0.45)
Stringency*RTA	0.00203*** (37.97)			
Government response*RTA		0.00188*** (37.30)		
Economic support*RTA			0.000609*** (14.66)	
Containment and health*RTA				0.00196*** (39.13)
Constant	−1.981*** (−50.12)	−1.934*** (−48.56)	−2.098*** (−51.76)	−1.937*** (−48.87)
Observations	30,109	30,109	30,109	30,109
Pseudo R <sup>2</sup>	0.1183	0.1178	0.1130	0.1185

**Note(s):** *t*-statistics in parentheses. \**p* < 0.05, \*\**p* < 0.01, \*\*\**p* < 0.001. All specifications are controlled for month fixed effect

**Source(s):** Table created by the authors

response indices during the pandemic significantly and positively influences the value-added trade. Specifically, the interaction with Stringency suggests that RTAs helped mitigate the typically negative trade impacts of stringency measures, such as lockdowns, potentially by preserving established trade channels or fostering cooperation that facilitated trade despite restrictions. Similarly, a positive coefficient of 0.000609 for Economic support indicates that the trade-enhancing effects of economic support policies, like income support or debt relief, were amplified when an RTA was in place, suggesting that RTAs may improve the channeling of such support towards trade-sustaining activities. Furthermore, the Containment and Health and the Government Response also demonstrate strong positive effects, with magnitudes of 0.00196 and 0.00188, respectively. These findings imply that FTAs, when combined with appropriate government responses during the pandemic, have helped to promote or sustain trade. COVID-19 presented both an economic shock (supply/demand disruptions) and, in some cases, a potential for political opportunism (governments expanding power under crisis, such as through export restrictions on medical goods). Trade policy responses, while framed as health measures, could be seen as opportunistic deviations from open trade principles. RTAs, therefore, play a vital role not only in mitigating economic disruptions but also in providing institutional checks and balances (e.g. dispute resolution, transparency) to prevent or constrain protectionist and opportunistic trade policy deviations by member states during a health crisis, even when the underlying constitutional order remains stable.

## 6. Conclusion

This study highlights the significant negative impact of the COVID-19 pandemic on bilateral trade flows among ASEAN countries. While the pandemic disrupted global supply chains and

reduced trade activity, our findings underscore the crucial role of government policy responses in mitigating these adverse effects. We found that economic support policies, in particular, have been effective in maintaining consumer purchasing power and stimulating production. Countries with robust economic support measures exhibited a more favorable trade performance, emphasizing the importance of proactive and well-designed policies in fostering economic resilience and trade continuity during crises. The limited positive impact of policy responses underscores the need for a nuanced approach. Policymakers should exercise caution when choosing and implementing policies, carefully weighing public health and economic goals.

Furthermore, we found that the positive and statistically significant coefficient for the RTA variable across all specifications indicates that regional trade agreements among ASEAN countries have contributed to increased trade value. This aligns with existing research, which suggests that RTAs can stimulate trade creation within the region while potentially leading to trade diversion from non-member countries. Our research suggests that participation in regional trade agreements can provide a buffer against external shocks. By fostering regional integration and facilitating trade within the bloc, these agreements can help mitigate the adverse effects of global disruptions.

The extended analysis further enriches these insights by interacting RTAs with disaggregated government policy response indicators. The results indicate that FTAs not only have a direct trade-promoting effect but also enhance the effectiveness of various pandemic-related government policies. Specifically, the positive and statistically significant interaction between RTAs and the Stringency Index, Government Response Index, Economic Support Index, and Containment & Health Index indicates that FTAs played a role in lessening the negative impact of these policy measures on trade. This suggests that RTAs serve as institutional buffers, reducing transaction costs arising from policy-induced frictions such as lockdowns, border controls, or new certification requirements. In particular, the interaction with the Stringency Index highlights the ability of RTAs to cushion the negative effects of mobility restrictions through established cooperation frameworks, while the positive interaction with Economic Support underscores how RTAs can amplify the trade-sustaining benefits of fiscal and financial aid measures.

From an institutional economics perspective, these results support the idea that RTAs reduce “institutional distance” among member countries, harmonize regulations, promote transparency and enable dispute resolution, thus reducing the risk of opportunistic trade policy deviations under crisis. RTAs play a critical role in maintaining the predictability and functionality of trade relations even during times of global upheaval. These agreements facilitate timely and coordinated responses through mechanisms such as information sharing, mutual recognition agreements and regulatory harmonization. By doing so, they help avoid the proliferation of non-tariff barriers and ensure the flow of essential goods during health emergencies.

As global supply chains experience significant disturbances, the collaborative frameworks established within regional trade agreements contribute to the greater stability of trade flows. The results suggest that participation in such agreements provides a buffer against the adverse effects of external shocks, offering a pathway for countries to navigate the challenges posed by the ongoing health crisis.

Effective strategies and policies for addressing future pandemics or catastrophes are crucial for building confidence within communities and businesses. This, in turn, fosters trust with the international community, ensuring the continued flow of trade and investment amidst global crises.

While our research highlights economic support as the sole positive influence on trade flow compared to other policy measures, the underlying factors are multifaceted. Economic support measures have likely boosted consumer and business purchasing power, enabling sustained import spending and potentially even stimulating increased imports. Furthermore, these measures may have helped businesses maintain their production capacity and operational

costs, ensuring a steady supply of exportable goods. Additionally, economic recovery in one nation can have a positive ripple effect on global trade.

Building on these insights, policymakers can implement targeted economic support programs for trade-reliant sectors such as manufacturing and logistics. Moreover, trade facilitation measures and international cooperation on economic recovery efforts can further amplify the positive impact on trade flows. Long-term investments in economic resilience, including innovation and supply chain diversification, can provide additional support in the face of future disruptions. By combining these strategies, policymakers can harness the power of economic support to significantly enhance trade flows and bolster global economic well-being.

For ASEAN countries, to enhance the resilience of ASEAN economies and mitigate the impact of future shocks, policymakers should consider the following measures:

- (1) **Diversification of Export Markets:** Diversifying export markets can help lessen the effects of potential disruptions in any particular region.
- (2) **Strengthening Supply Chain Resilience:** Investing in supply chain diversification, digitalization and resilience can help minimize disruptions and ensure the smooth flow of goods and services.
- (3) **Promoting Trade Facilitation:** Adopting measures to simplify customs processes, lower trade barriers and upgrade infrastructure can promote trade and strengthen competitiveness.
- (4) **Enhancing Regional Economic Integration:** Deepening regional economic integration through RTAs can foster trade and investment flows within the region.

By addressing these policy priorities, ASEAN countries can position themselves to better withstand future economic challenges and capitalize on emerging opportunities in the global economy.

While this study successfully addressed key research questions, certain limitations warrant further investigation. Firstly, the focus on bilateral trade flows may have overlooked potential multilateral trade effects. Secondly, the study may not have fully captured the diversity and complexity of government policy responses across different countries.

### Supplementary material

The supplementary material for this article can be found online.

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