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Global Ripple Effects of the Trump Tariff War on Trade, Economic Growth, and Inflation

Janardan Behera
Department of Statistics, Ravenshaw University, Cuttack, India
ORCID: 0000-0003-1277-7557 Researcher ID: janardan1991
janardanbeheragreetsyou@gmail.com

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Abstract: The United States' imposition of tariffs during the Trump presidency between 2018 and 2020 activated one of the largest trade disputes in recent economic history. This analysis studies the international ripple effects of the tariff actions on international trade flows, economic growth, and inflation across both emerging and developed economies. Utilizing a balanced panel dataset of 70 nations between 2015 and 2022, the analysis uses fixed effects as well as dynamic panel regression specifications to approximate the short- as well as medium-term trade contraction shocks that tariffs cause. The study demonstrates that increased tariff exposure significantly reduced world trade volumes, as well as considerably decreased GDP growth rates, yet at the same time, it caused weak yet persistent inflationary pressures through disintegrated supply chains and increased import costs. The study demonstrates the asymmetry of the effect, with developing nations experiencing higher exposure to trade contraction. The study demonstrates the wider macroeconomic costs of protectionist trade policies as well as the importance of revived multilateral cooperation to stabilize markets globally as well as achieve sustainable growth.

Keywords: Trump tariff war, global trade, economic growth, inflation, protectionism, spillover effects.

JEL Classification: F13; F14; F62; E31; O47; C33.

Introduction

The current re-emergence of trade protectionism is a notable departure from the post-war international economic consensus that supported free and rules-based trade. Perhaps the most influential development along these lines has been the United States, under the Trump presidency, imposing a series of tariffs in the years 2018–2020. The policies, enacted to correct perceived trade deficits as well as reinvigorate domestic manufacturing, triggered a cascade of retaliatory policies and global economic repercussions. The ensuing "tariff war" soon spread beyond the bilateral relationship between the United States and China to impact global supply chains, commodity markets, and macroeconomic performance within both developed and developing economies. The episode constitutes a timely as well as unique opportunity to study how extensively interconnected through trade as well as networks of production modern economies react to large-scale policy shocks. Against this background, the current study hopes to quantify as well as interpret the global ripple effect from the Trump tariff war, with particular emphasis being put on trade, economic growth, and inflation dynamics.

The intensification of trade frictions between the United States and several principal commercial partners during the period from 2018 to 2020 constituted a significant inflection point in the postwar trajectory of international economic engagement. Seeking to narrow the United States' trade deficit and shield domestic manufacturing constituencies, the Trump administration enacted a sequence of tariffs on imported steel, aluminum, and an extensive array of Chinese products. Although couched in the language of "fair trade" and national economic security, these interventions ultimately signaled one of the most pronounced departures from the established norms of open, rules-oriented commerce since the inception of the World Trade Organization (WTO). China, the European Union, Canada, and several other countries responded to the U.S. tariffs by imposing retaliatory tariffs on U.S. goods and services. This resulted in a vicious cycle of trade barriers that led to global market instability and created challenges for policymakers to manage regional policies. The series of tariffs demonstrated how fragile the current level of international economic dependence among countries is. The tariffs have implications that go far beyond

bilateral relations between countries; they also reflect the complexities of the current international division of labor based on the Global Value Chain (GVC). GVCs consist of complex networks of production processes where raw materials and intermediate products move internationally as part of a single production process, often being used in more than one country to produce finished products for consumption. In this context, the implementation of tariffs at these levels will disrupt these interlinked systems, raise production costs, and add new uncertainty to the strategic planning process of multinational firms that have relied on a predictable transnational flow of inputs. These disturbances affect not only the principal exporters and importers directly implicated in the tariff confrontation, but also peripheral economies integrated into the chains through intermediary trade. Commodity markets, logistical systems, and cross-border investment decisions all experienced discernible volatility during this interval, often manifesting in abrupt changes in expectations and risk assessments. In essence, the Trump-era tariff conflict provides a quasi-natural experiment for examining the interaction between restrictive trade policy and broader international economic performance.

In contrast to the restrictions on trade seen in the commercial policies of the 1930s or the policy shifts made in response to the post-oil price crises of the late 1970s, the tariffs of the 2018-2020s developed in an entirely new context created by the dense connections through technology between countries, the rapid, flexible nature of modern manufacturing processes, and the increasing integration of the world's financial systems. The tariffs were therefore a sudden, outside imposition into what had been until then an extremely open trading environment; they provided an opportunity to study the ways in which trade flows, the patterns of expansion in output, and the development of inflationary pressures changed from country to country in a variety of environments. In aggregate terms, the changes provide insight into the extent to which the current global economy has demonstrated resilience in sustaining the existing global economic structure while also demonstrating the subtle vulnerabilities in the highly interconnected global economic system, which are exposed under the effects of abrupt policy disruptions. In spite of the vast literature on the debate over Trump's tariff policies, most current research continues to be patchy and unidimensional. The vast majority of the literature has analyzed the bilateral relationship between the United States and China due to the importance of their trade relationship; however, viewing the tariff war solely as a bilateral issue ignores its implications within the systemic context. With the growing integration of the world economy, the spillover of trade restrictions cannot be contained within the borders of a nation. Tariff shocks imposed by one significant economy spread along the chains of supplies, transform commodity prices, and restructure investment flows across regions. In addition, current empirical studies are mostly focused on micro-level responses, including firm productivity, sectoral production, or consumer surplus, in particular economies. Although these are worthwhile efforts, they do not capture the macroeconomic implications that are enabled through trade interdependence at the global level. Second-order spillovers through diminished volumes of trade, inflationary impulses, and decelerating output growth in non-targeted nations continue to be incompletely gauged. This omission has implications that are most severe in developing economies that rely heavily on supply chains that operate internationally or commodity-based economies that export, where there is a potential for secondary spillovers to be deep and long-lasting. The lack of clear, cross-country evidence hinders us from understanding how spillovers of protectionist shocks from one area of the world spread throughout the remainder of the international system. Without it, policymakers will be prone to incorrectly estimating the size of spillovers to the international economy as a whole and will enact reactive policies that will exacerbate economic instability instead of lowering it. The world can therefore benefit from empirical data that put specific numbers on the international pass-through of spillovers from tariff shocks and evaluate the cumulative effect of such shocks through trade, growth, and inflation. The final motivation of the present study is to fill that gap. The primary goal of this study is to investigate the restructuring of the global economic landscape that resulted from the tariff measures introduced under the Trump administration with their spillovers on the execution of trade and economic output growth, as well as the inflationary trajectory. Treating the 2018-2020 tariff war as a large-scale policy experiment within the highly interlinked world economy, the study aspires to generate systematic empirical evidence about the extent as well as the nature of its international spillovers.

Specifically, the research is structured based on the following general purposes:

• **To estimate the global economic shocks of tariff shocks.** The study considers the impact of the rise in the tariff rates of the United States on international trade volumes, GDP growth, and consumer price index inflation among a general sample of countries. The study applies the panel data method to capture both the direct and the indirect effect imposed by the exposure to tariffs on the macroeconomic performance over time.

• **To study the heterogeneity across developed and developing economies:** Global economies differ significantly in the extent of structural trade reliance and industrial connectivity, as well as market responsiveness. The study accordingly separates the sample between industrial and emerging economies to see whether the size

as well as the length of the tariff impulse differs across levels of development. This dichotomy helps to ascertain the most impacted economies due to the protectionist impulse as well as why.

The study looks at three significant channels as well as the diffusion of tariff shocks around the globe: (i) the trade exposure channel, explaining reductions in export and import volumes. The analysis, therefore, will present researchers and policymakers with a greater comprehension of both positive and negative effects stemming from unilateral trade measures on the international economic system. The second purpose of the study is to contribute to active debates among economists and policymakers, as well as global organizations, on the question of whether free and open international trade can be maintained in the long term and whether the present international economic order can be preserved.

This extensive analysis is particularly topical in view of the expanding and increasingly urgent body of scholarship that places trade policy within the web of interlinked global macroeconomic relations. It does so by providing an empirical perspective on the intricate Trump tariff war and its ramifying, complicated effects around the globe. While there have been many studies that have thoroughly examined the domestic effects resulting from the tit-for-tat tariff increases, relatively few have taken the effort to understand its means of global transmission or have attempted to quantify its macroeconomic effects in most countries. By effectively addressing this notable gap in existing literature, the present work not only offers conceptual advancements but also provides empirical insights that deepen our understanding of the nature and magnitude of protectionist spillovers in an economy that is deeply interconnected on a global scale.

First, the study undertakes to construct an extensive and comprehensive cross-country dataset containing a composite set of seventy major economies between the years 2015 and 2022. This specific period falls within an array of distinct phases consisting of the pre-tariff period, the period of tariff imposition, and the immediacy following the pandemic and is important to grasp the interplay of global economic activity. Such clearly defined temporal and spatial coverage also ensures the uniform and systematic exploration of the interplay between trade constraints and aggregate economic performance across different macroeconomic settings. Also, the coverage, consisting of developed economies and emerging markets, ensures that this analysis properly accounts for the set of various asymmetries belonging to vulnerability and resilience and the different policy responses.

Second, the study presents an innovative and unprecedented measure of what tariff exposure is termed. This measure has been painstakingly constructed using vast and comprehensive data received by the United States Trade Representative (USTR) and the World Trade Organization (WTO). In contrast to simplistic tariff averages that might overlook important nuances, this index offers a more sophisticated approach, as it incorporates various factors such as product-level coverage and trade-weighted importance and also takes into account the relative dependence that each partner economy has on the markets of the United States. The resulting indicator that emerges from this methodology enables a far more precise and accurate assessment of the differences in exposure levels across countries to the tariff measures enacted by the Trump administration. Third, the research successfully bridges the enormous analytical gap that arises between international trade and the macroeconomic results by looking at the three most important aspects of international performance simultaneously, namely trade volume, output growth, and inflation. Existing research in the field has usually dealt with the said significant variables individually and independently of each other; however, it is vitally important to take cognizance of the fact that they are naturally interlinked within the parameters of an internationalized economy. Through the utilization of advanced and sophisticated fixed-effects models combined with dynamic panel regression frameworks, this paper effectively captures not only the immediate contemporaneous effects but also the subsequent lagged effects. It reveals more about the aggregate economic impact caused by tariff shocks.

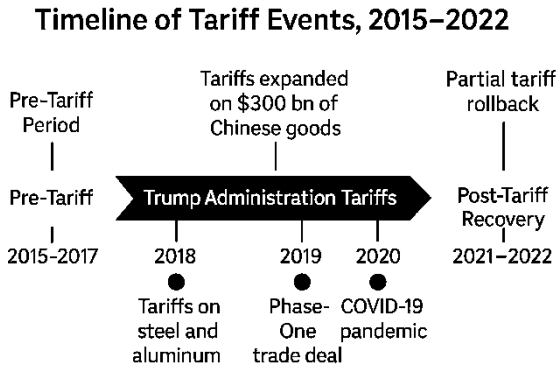
Fourth, this research significantly enriches and contributes to the available body of empirical evidence by carefully distinguishing between and quantitatively gauging the various routes through which tariff shocks diffuse and migrate through international boundaries from one country to the next. Such channels include the trade exposure channel, which specifically mirrors the disturbance that arises due to export–import linkage disruptions between nations; the commodity price channel, which accurately captures the readjustments that arise in input and energy markets due to these disturbances; and the inflation pass-through channel, which gauges the way costs are transmitted to final price levels domestically within various economies. Tracing these complex linkages helps to enrich the explanatory richness within global macroeconomic interactions to better understand how interlinked economies react to these kinds of external disturbances.

Ultimately, from the perspective of policy analysis, the research yields significant evidence-based observations that highlight the broader implications and consequences attached to protectionist trade policies. Most insistently, the research conclusively underscores the fact that unilateral tariff policies that are often framed with the ultimate goal of protecting local industries can end up inducing various costs globally. Such costs emanate from

reduced efficiency, increased market unpredictability, and the shifting of inflationary pressure to other frontiers. By carefully chronicling these intricate processes through the lens of empirical research, the paper is an important addition to various extant contemporary policy deliberations about the future trajectory of multilateral trade governance. Most importantly, it highlights the salient significance attached to building conjunctive frameworks to serve an integral purpose where long-run worldwide economic stability is considered.

Collectively, by examining all these different pieces, they together place the study at an important juncture where international economics and macroeconomic policy analysis intersect. This study not only builds upon but substantially enriches our empirical knowledge about the way shocks emanating from one large economy can potentially spill over across national boundaries to end up influencing the economic performance and the welfare on the world stage of countries themselves. To put the empirical investigation into clear context, Figure 1 depicts a timeline of major tariff interventions and related policy shocks between 2015 and 2022. The pre-tariff years of 2015–2017 are representative of a stable trade regime with no major tariff disturbances. In 2018, large-scale import tariffs on steel and aluminum were announced by the U.S. administration and thus began a period of heightened trade tensions. Further, the duties on more than USD 300 billion worth of Chinese goods in 2019 represented the peak of the tariff confrontation. This also coincided with important geopolitical and macroeconomic events such as the Phase-One trade deal and the onset of the COVID-19 pandemic in 2020, further adding to the volatility in supply chains. The years 2021–2022 reflect a partial rollback and stabilization period during which several tariff measures were reassessed or softened. The chronological mapping as a result helps set the empirical framework in which the dynamics of global trade volume, GDP growth, and inflation grow.

Figure 1. Timeline of Major Tariff Events, 2015–2022



The following sections of this document are structured to showcase progressive logical growth from theoretical justification to data confirmation and interpretation of policy meaning. Following the opening section, which outlines the study's rationale, objectives, and contributions, each successive section is carefully designed to progressively build on the previous one and thus sustain conceptual clarity and analytical rigor.

Section 1 is an in-depth survey of the available literature on international trade protectionism, international value chains, and the economics of tariffs. It brings together theoretical and empirical evidence from earlier research and determines the research gaps that spur the undertaking.

Section 2 addresses the theoretical framework upon which the research is grounded. It identifies the conceptual mechanisms by which tariff policies place influences on volumes traded, total output, and inflation and identifies the signs of these latter influences anticipated. Section 3 also places the study within the wider compass of the theory of the open economy and the macroeconomic.

Section 3 outlines the data sources, variable construction procedure, and the econometric methodology employed. Also included is a general discussion of the structure of the panel dataset, the construction of the tariff exposure index, and the econometric models employed to study the related links. Also covered are the diagnostic tests and the robustness checks to ascertain the validity of the results. Section 4 summarizes the reciprocal tariff.

Section 5 discusses and interprets the results. Descriptive statistics and the results of estimation and tests of robustness follow. Then an elaborate discussion on the effect of tariff shocks on international trade, the growth of the economy, and inflation by various economic types is provided. This section brings out the comparative impact between developed and developing nations and the examination of the significance of the transmission mechanisms. Section 6 discusses the policy implications derived from the empirical investigation undertaken. It evaluates the broad implications relevant to the determination of trade policies, the functioning of the multilateral

institutions, and strategies to moderate the macroeconomic consequences related to protectionism. This section links the accumulated results from the study to the dominant discussion about the management of the world economy.

Finally, Section 7 summarizes the document by pointing out the key results, highlighting key insights, and suggesting future research. The final section addresses the implications of the results for future international economic integration amid the rising trend towards protectionism.

1. Literature Review

Systematic and organized survey coverage of the theoretical and the empirical literature is equally important to understand the different ways through which the policies of tariffs affect the outcomes of the economy globally. In addition to this, it is also necessary to place the current study within the broad canvas of prevailing discussion and debate on international trade and interdependence at the macroeconomic level. The literature that addresses trade theory and protectionism has progressed over decades and has undergone considerable transformation from the classical concepts revolving around comparative advantage to more recent models. Modern models indicate critical aspects involving economies of scale, differentiation of products, and the complex production networks at the global level. The theoretical basis developed within this literature is essential to appropriately understand the various ways through which tariffs can affect efficiency, welfare, and growth within different economies.

The empirical dimension of the existing body of literature, in stark contrast to other areas, has placed a significant emphasis on the quantification and assessment of the tangible effects that trade restrictions impose on various factors, including prices, output, and overall welfare. This assessment has been undertaken using partial equilibrium models alongside general equilibrium strategies and has provided an overarching perspective on the process. Most recently, academic studies that have come to the fore following the Trump tariff episode that ran between 2018 and 2020 have remarkably broadened this discussion and added considerable insight and knowledge about the intricate processes through which these protectionist shocks can propagate and diffuse beyond national frontiers. In this context, studies carried out by prominent international organizations such as the International Monetary Fund (IMF), the World Bank, and the World Trade Organization (WTO) have been complemented by academic analyses conducted by institutions like the National Bureau of Economic Research (NBER) and featured in leading economics journals; together, they have meticulously examined both the direct and indirect consequences arising from the ongoing tariff war. However, despite these worthwhile additions to the literature, the available research still manifests its highly fragmented character that differs greatly along different methodological strands and geographic coverage. Most academic research that has been written to date is mainly concerned with bilateral trade links, particularly those between the United States and China, with comparatively little attention directed towards learning how these trade policies ultimately affect the larger worldwide system on the whole. These interactions between tariffs, aggregate demand, price levels, and long-run growth are often studied individually and not recognized as an interlinked family of macroeconomic processes that feedback on each other. Furthermore, not many studies have bothered to combine the study of trade patterns, inflationary processes, and output levels within an internally consistent and unified data structure that employs cross-country data to gain a more complete perspective.

Based on the outline provided, this section undertakes an intensive review of the available body of literature in four different dimensions. Section 1.1 explores the theoretical basis that undergirds the notions of trade and protectionism, painstakingly tracing the manner by which classical and new trade theory conceptualize the outcomes related to efficiency and the welfare consequences that emanate from the imposition of tariffs. Section 1.2 integrates a set of various empirical results emanating from the key studies undertaken on the Trump tariff war and its collateral episodes relating to protectionism, with special attention directed towards the spillover consequences on the worldwide front that these measures have generated and the inflationary dynamics that these measures have witnessed. Section 1.3 identifies and underscores the key deficiencies that exist within the available versus the required literature and serves to inspire and inform the direction of the extant research undertaking, wherever applicable. Section 1.5 draws attention to the manner by which the extant study advances the extant undertaking by virtue of its novel multi-country aspect and its macroeconomic orientation. Taken together, these expositions serve to create the strong scholarly backdrop on the basis of which the analytical structure and the econometric model to be developed and analyzed subsequently shall be grounded.

1.1. Theoretical Foundations

The theoretical foundations behind international trade are important because they give us a comprehensive framework to help further our understanding of the significant implications tariff interventions can have on all things

from production quantities to total welfare and the overall macro-economy. Over the last couple centuries, trade theory has dramatically changed; the process has moved from classical and neoclassical theory to more recent models that combine elements of imperfect competition and the intricacy of the global value chain. This has shaped economists' knowledge not only about the gains related to openness at the economic level but also the negative impacts related to protection policies. Furthermore, the different theoretical frameworks are also crucial to understand and analyze the ways major policy disturbances, such as the tariff plans implemented by the Trump administration, resonate and transmit through the highly connected international economy.

The intellectual genesis and roots of trade theory can be attributed to classical works by two renowned economists, namely Adam Smith and David Ricardo, whose writings provided the basis to understand international trade. Smith's principle of absolute advantage pointed to the fact that countries can greatly gain by specializing in the production of goods where they are more capable of producing efficiently compared to others, which subsequently generates an increase in world output and brings about mutual prosperity among countries (Smith, 1776). Ricardo, however, further developed this first line of reasoning through his principle of comparative advantage, where he demonstrated that although a country is less efficient at producing each kind of good compared to others, mutually advantageous results can be achieved by trade if each country specializes along the lines of relative production efficiency (Ricardo, 1817). Such seminal insights together provide the normative basis to the notion of free trade that trade openness brings about a more efficient allocation of resources and maximizes welfare for the common benefit of the entire set of actors.

The refinements related to neoclassical economics that were most centrally championed by economists Heckscher and Ohlin contributed substantially to the prevailing classical theory through the introduction of the notion of the endowments of factors to serve as the determining bases that affect comparative advantage (Heckscher, 1919; Ohlin, 1933). Under the Heckscher-Ohlin (H–O) model paradigm, it is argued that nations will tend to export goods that extensively use their abundant production factors and at the same time import goods that rely on factors that are relatively scarce within the corresponding economies. Additionally, the aspect of tariff protection within the equation results in the distorting of the relative prices and the allocative efficiency of resources, thus eventually bringing down the welfare within the entire globe. According to the Stolper-Samuelson theorem, an added perspective is provided where it is shown that tariff imposition not only changes the relative returns to various production factors but also yields gains to the owners of the protected production factors and at the same time reduces the real incomes of other economic groupings (Stolper and Samuelson, 1941). All these classical and neoclassical theories of the economy serve to highlight the fact that although, on the surface, protectionism renders short-run gains to specific interest groupings within the economy through its various implications within the economy, it always results in the suffering of efficiency losses due to its consequences on the entire economy and results in the depletion of the overall welfare in the long run.

While classical economic models and the Heckscher-Ohlin (H–O) model successfully capture the fundamental roles of technology and factor endowments in international trade theory, they ultimately fail to provide a satisfactory explanation for the considerable volume of trade that occurs among economies that are quite similar in nature. The arrival of the new trade theory (NTT) during the late twentieth century, which was significantly advanced by the work of Krugman (1979, 1980), brought forth critical concepts such as increasing returns to scale, monopolistic competition, and the importance of product differentiation as essential factors that determine patterns of trade between countries. Within this newly established framework, the process of trade liberalization enables firms to take full advantage of economies of scale, thereby facilitating the expansion of product diversity available in the market and ultimately leading to enhanced welfare for consumers. On the other hand, the implementation of tariffs tends to constrict the size of the market, which in turn limits the potential efficiency gains that firms could achieve, and it also results in elevated average production costs. This combination of factors serves to undermine both innovation and the overall growth of productivity within the economy.

Subsequent advances within the new economic geography (NEG hereafter) literature by Krugman (1991) and Fujita et al. (1999) embedded and added spatial considerations within various trade models. These remarkable additions illuminate the way that transportation costs and agglomeration forces determine the optimal location of production activity. Models framed within this study evidently demonstrate that quite modest trade barriers can cause considerable geographic redistributions within industry configurations and investment streams and thus the potential strengthening and weakening of dominant production centers globally. During the twenty-first century thus far, what has been witnessed is the development of what has come to be called the global value chain (GVC) paradigm by scholars such as Gereffi (2018) and Baldwin (2016). Under the models of GVCs, what is remarkable is that the intermediate inputs travel across national frontiers on many occasions before ending up on the shelves of the final consumers, thus building complex interlinkages between various economies through complex production

networks that are highly interconnected. Herein, the tariffs can be described as representing some sort of shock that not only reduces the volumes of bilateral trade between nations but also causes disruptions along the various supply chains, leading to the escalation of costs along the production units that exist downstream around the world. By virtue of these processes, the welfare loss that is related to protectionism, especially considering the perspective grounded on the interdependence along the GVCs, can take the shape of the shock and get disproportionately magnified compared to what the previous trade models would have anticipated. Such an aspect has massive implications for understanding the various mechanisms of transmissions that characterize the Trump tariff war, where tariffs levied on intermediate goods such as electronics, steel, and machinery have generated outcomes in the production structure that span far beyond the United States and Chinese frontiers.

The theoretical foundation for protectionism has always been based on a range of claims, most notably the infant industry argument (List, 1841), national security considerations, and strategic trade theory in oligopolistic industries (Brander and Spencer, 1985). Although these claims suggest limited instances where protectionism can raise the welfare level of the nation, the common view held among mainstream economists is that the long-run cost outweighs any short-run gain. At the partial equilibrium level, introducing tariffs causes higher prices domestically, consumer surplus to fall, and breeds deadweight losses through production and consumption misallocation (Corden, 1974). At the more general equilibrium level, tariffs cause distortions in the determination of the allocation of relative prices, lower efficiency, the reshuffling of income distribution, and losses to world welfare.

Recent developments within the scope of macroeconomic theory provide further evidence indicating that the imposition of tariffs on intermediate products generates high production costs within industries relying on these inputs, particularly those that are downstream within the production chain. Such an increase in costs thereby lowers the long-run competitiveness of these sectors and can lead to the decline of employment opportunities (Grossman and Helpman, 1995). Furthermore, open-economy models that encompass flexible exchange rates predict that currency appreciation could alleviate some of the damage caused by the tariffs; however, it is important to note that currency appreciation can also cause price spillovers on an international level and thereby manifest its other economic implications (Obstfeld and Rogoff, 1996). Furthermore, uncertainty about future trade policy, whether an increase within existing tariffs or the potential abolition thereof, can greatly deter private investment and thereby retard the growth rate of productivity within the affected industries. Such various mechanisms cumulatively signify that protectionist policies not only cause adverse dynamic consequences but also manage to spill over far beyond the immediate budgetary or trade targets that might initially encourage such policies.

The theories explained in the earlier sections give valuable insights into how tariff shocks blow out through myriad channels and sooner or later reshape the complex web of the global economy. First and foremost, it would be apt to highlight the fact that tariffs have the inherent ability to substantially restrict trade flows, largely by increasing the costs of imports and consequently disrupting the relative prices prevailing between domestic and foreign goods. Once the imposition of such duties occurs specifically upon intermediate goods, the impact spreads even further and wider, as they extend beyond national borders through complex networks of global value chains, consequently expanding disruptions throughout each and every step of the production cycle. At the same time, the buildup of input costs feeds through into prices faced by consumers, which gives rise to the formation of inflationary pressures and, at the same time, slows down both output and investment ratios. This dual impact, defined by increasing prices occurring simultaneously along with weakened economic growth, often gives rise to macroeconomic imbalances, which are challenging, if not impossible, to rectify even in the short term. Moreover, operating in an era where the world remains exceedingly interconnected through complex production and trade networks, it becomes indispensable for us to comprehend the fact that the welfare losses arising as a consequence of the pursuance of protectionist policies are far from isolated to the nation initiating same. However, these negative effects radiate outward, and they give rise to the dilution of both efficiency and stability throughout the entire global economic complex. These rudimentary concepts are the conceptual foundation of the current study, the latter of which seeks to empirically examine and codify the impact of the Trump tariff war upon the dynamics of international trade, economic growth, and inflation throughout numerous nations of the globe.

1.2. Empirical Studies on Trade Wars and Tariffs

The tariff episode that occurred between 2018 and 2020 has been the focus of much empirical research on its important economic effects, particularly on various outcomes related to prices, trade flows, welfare, and overall macroeconomic impacts. Early contributions were able to put numbers and emphasis upon the manner in which U.S. tariffs not only increased the prices of imports but also inflicted significant welfare costs upon domestic consumers and firms doing business within the United States. Based upon highly detailed, transaction-level data relating to U.S. imports, Amiti et al. (2019) reveal that the imposition of tariffs meant the domestic prices of affected

products increased while, concomitantly, measurable welfare losses were visited upon U.S. consumers and producers active within the market. Subsequent studies by the same authors went on to both build upon and extend these initial results, showing how much of the tax levied by the tariffs was passed on to US importers and consumers within the short term (Amiti *et al.* 2020).

Some of the broader general-equilibrium studies by Fajgelbaum et al. (2020) examine the effects of the return of protectionism and pay particular attention to the measurement of both aggregate and region-specific effects stemming from the imposition of U.S. tariffs and matching retaliatory action by others. Based on the present studies, the results uncover large reductions in bilateral trade flows, along with significant welfare losses, estimated to be particularly severe among those industries most dependent upon imports. In addition, this detailed study draws strong attention to the importance of taking into account not only the direct impact of tariffs but also the subsequent retaliatory action so as to comprehensively estimate the economic toll of a tariff war.

Global institutions have made detailed evaluations concerning the macroeconomic effects that stem from heightened trade tensions between countries. The World Economic Outlook of the International Monetary Fund issued in October 2020 noted with strong emphasis the fact that the presence of high trade barriers and significant policy uncertainty had played an indispensable role in helping to cause the weakening of international trade and the less favorable growth prospects between the years 2019 and 2020, and this has also negatively interacted with the economic disruptions emanating from the COVID-19 pandemic (International Monetary Fund, 2020). Furthermore, complementary studies issued by the World Trade Organization have detailed fully the fact that the expansion of merchandise trade virtually stalled in 2019 and have presented the means by which both tariff and non-tariff interventions have played key roles through helping to bring into place a trade environment characterized by increased uncertainty and unpredictability (World Trade Organization, 2020a, b). Some of the other empirical contributions proceed to analyze the price pass-through, firm-level responses, and the adjustments associated with all the supply chains. Studies undertaken both at the firm level and the sector level demonstrate the existence of heterogeneous effects among the various industries. This happens most predominantly for the producers of intermediates, where imports are most prominent, and the producers are most affected by the rise in costs brought by the imposition of tariffs (AmitiReddingWeinstein2019, AmitiReddingWeinstein2020). Furthermore, the cross-country reports and case studies offered by the trade agencies, foremost of which include the Trade Policy Agenda and the Annual Report of the United States Trade Representative, provide an excellent policy chronology together with specific product coverage. These data are most useful when creating indices of tariff exposure (Office of the United States Trade Representative (USTR), 2020).

Considering the aggregate body of empirical literature, it paints a remarkably well-defined and uniform picture: the tariffs implemented under the Trump administration increased the costs of trade, reduced both bilateral and multilateral trade flows, and consequently, caused welfare losses. Furthermore, the tariffs generated heterogeneous distributional and inflationary effects, and these varied throughout different countries and industries. However, most of the existing research so far has either focused predominantly on the United States' perspective or on the bilateral trade relationships. Thus, little attention has been given to broad-based, multinational-spanning panel estimates of the effects of tariffs on trade volumes, aggregate economic growth, and inflation rates. To this end, the current study makes an effort to supplement these useful empirical findings while, at the same time, extending the scope of the analysis to cover a broad panel of countries and making explicit links between the tariffs and the macroeconomic inflation dynamics.

1.3. Gaps in Existing Literature

While the empirical evidence on the 2018-2020 tariff episode has increased exponentially, there are three significant gaps that inspire the current study. First, most of the good-quality empirical evidence focuses on bilateral or single-country approaches, frequently targeting the United States or the United States-China partnership. Iconic contributions have revealed the incidence of tariffs on domestic prices and the prospective welfare loss for US consumers and firms (Amiti *et al.* 2019; Fajgelbaum *et al.* 2020), but the focus is largely national or bilateral. Therefore, there is little systematic evidence concerning the spread of tariff shocks through the interlocking networks of international trade and production links among a sizable panel of countries. This gap inhibits us from measuring the total international transmission of protectionist disturbances and contrasting inter-country heterogeneity of exposure and results.

Second, while several studies document price pass-through and tariff incidence at the border and at retail (*e.g.*, demonstrating substantial short-run pass-through into import and consumer prices), the connection between tariffs and aggregate inflation dynamics across countries has received less consistent attention. Research by Cavallo et al. (2021) and related contributions has illuminated how tariffs affect import and consumer prices in the

originating country (Cavallo *et al.* 2021), and other work has emphasized supply-chain linkages affecting exports and production (Handley *et al.* 2022). Yet, a comprehensive cross-country assessment that links tariff exposure to national inflation measures, accounting for exchange-rate adjustments, dominant currency pricing, and second-round effects via global value chains, remains underdeveloped. Filling this gap is critical for understanding whether tariff shocks produce only localized price effects or broader inflationary pressures that complicate macroeconomic policy making. Third, while several influential works estimate short-run effects (2018-2019) based on microdata or country-level models, few unified, medium-term, cross-country studies spanning the pre-tariff, tariff, and early post-tariff periods exist, using the same empirical approach. The tariff episode coincided with other significant global shocks (most prominently the COVID-19 pandemic), making it hard to disentangle and draw inferences within narrow empirical approaches. Prior work has developed approaches to identification and firm-level measurement, but few panel-based macro methods exist that estimate, simultaneously, effects on trade volumes, GDP growth, and inflation across a wide panel of economies. This would permit controlling for shared global shocks, exploiting cross-country variation in tariff exposure, and evaluating persistence and heterogeneity in outcomes.

Briefly, though the literature successfully demonstrates that 2018-2020 tariffs increase trade barriers and generate welfare losses in the economies under direct observation (Amiti *et al.* 2019; Fajgelbaum *et al.* 2020; Cavallo *et al.* 2021; Handley *et al.* 2022), it falls short of providing an exhaustive, cross-country, panel-data macroeconomic quantification of multilateral spillovers and inflationary transmission. These shortcomings are addressed in the current study by embracing a panel-data methodology for a broad set of countries, by creating a trade-weighted tariff exposure index, and by modelling the concomitant dynamics of trade, output, and inflation explicitly and controlling for simultaneous global shocks.

1.4. Summary Table of Literature

Table 1. Summary of key recent empirical studies on tariffs, trade wars, and macroeconomic effects.

Reference	Key focus	Main findings/conclusions
Amiti, Redding & Weinstein (2019). (Amiti *et al.* 2019)	Import prices, tariff incidence, consumer welfare (U.S. focus).	The paper uses transaction-level import data to document the nearly complete pass-through of the 2018 U.S. tariffs into duty-inclusive prices and estimate welfare losses to U.S. consumers and firms.
Amiti, Redding & Weinstein (2020). (Amiti *et al.* 2020)	Longer-term tariff incidence and adjustment.	This research builds on previous research to examine these tariffs in the medium term and is revealing ongoing price effects and adjustment mechanisms for both firms and consumers.
Fajgelbaum, Goldberg, Kennedy & Khandelwal (2020). (Fajgelbaum *et al.* 2020)	Aggregate and bilateral welfare effects of the 2018–2019 tariff escalation.	A general-equilibrium analysis estimates large reductions in bilateral trade, full pass-through for uniquely targeted products, and welfare losses that are sizeable and concentrated in import-intensive sectors.
Cavallo, Gopinath, Neiman & Tang (2021). (Cavallo *et al.* 2021)	Tariff pass-through at border and retail prices using microdata.	Micro evidence reveals that U.S. tariffs had high border pass-through rates and that there is heterogeneity in the effects at the downstream retail level; pass-through of import prices is greater than pass-through of exchange rates for affected goods.
Handley, Kamal & Monarch (2022). (Handley *et al.* 2022)	Supply chain exposure: import tariffs and export growth.	Empirical evidence shows that firms/products most exposed to increased import tariffs have a loss in export growth, reinforcing how import barriers are passed through into lower export growth through contemporary supply chains.
Furceri, Hannan, Ostry & Rose (2020).	Tariffs and long-run growth: panel evidence (multi-country).	Utilizing five decades of panel data, the authors provide evidence that tariff increases result in sustained declines in output growth, with heterogeneous impacts on types of countries.

Reference	Key focus	Main findings/conclusions
Furceri, Hannan, Ostry & Rose (2022).	Macroeconomic dynamics after tariff changes (impulse responses).	Local-projection estimates suggest that tariff hikes would lead to a decline in output and productivity over the medium term and higher unemployment and higher inequality while leading to external macro risks from protectionism.
Bown (2021).	Comprehensive mapping and policy chronology of the U.S.–China trade war (Phase One).	Includes measurements that detail policy instruments (tariffs, exclusions, and other measures), timing of measures, and extent of coverage by tariff measures, and serves as the primary resource for measuring tariff exposure indices.

1.5. Distinctiveness of the Current Study

A careful and detailed survey of the prevailing body of theoretical and empirical literature demonstrates that the vast majority of studies relating to the episode of tariffs experienced between 2018 and 2020 have largely considered only the domestic or bilateral effects of the episode. Nevertheless, this strand of investigation has tended to neglect the broader, all-encompassing effects of the kind that may emerge due to the implementation of this type of trade policy. This trend stands diametrically opposite to the present study, which pursues an integrated and broader approach by applying the cross-country angle of view. Adopting this angle of view makes it possible to consider, through detailed observation, the interlinked reactions associated with trade, outputs, and inflation, all of these considered through the same all-inclusive analytical perspective. Through this detailed analytical endeavor, the study, apart from providing new empirical evidence, brings forth new methodology, through which the scope and the intensity of the study are far broader and longer than the precedent. Through this, the study makes an informative and meaningful addition to the prevailing discourse.

To begin, it is essential to highlight the fact that this study openly links tariff policy and three of the most important macroeconomic outputs, which are mutually interconnected, namely the level of international trade, the rate of growth of real GDP, and the rate of consumer price inflation. Earlier studies have tended to consider these economic outputs individually, often focusing on aspects of the trade balance or welfare measures independent of trade dimensions. This study, by using the same panel-data structure to estimate their mutual interdependence, effectively conveys the complex inter-organizational manner by which tariff shocks are able to impact numerous aspects of economic life simultaneously. This broad-based approach both better conveys the nature of the relationships between the business cycle and protectionist policy and helps to illuminate the dynamics of inflation set against the backdrop of an increasingly integrated world economy.

Considerable effort has gone into the creation of the Tariff Exposure Index. This index is constructed using product-level and partner-specific information made public by the U.S. Trade Representative (USTR) and the World Trade Organization (WTO). This index not only calculates the average tariffs applied but also integrates the trade-weighted exposure, thereby determining the extent of each country's exposure to tariffs imposed by the U.S. Its use in multi-country settings allows for effective cross-national comparisons. Furthermore, it plays a crucial role in bridging the methodological divide that has often characterized earlier analyses focused solely on single countries or specific sectors.

It therefore captures the relative susceptibility of each nation to the United States' actions on tariffs. Application of this index within the multinational context, therefore, finds especial importance, since it makes feasible and, better still, proper cross-country comparisons. Secondly, the application of this index fulfils the key role of overcoming the methodological divergences that have frequently been the hallmark of pre-existing studies limited strictly to single-nation or single-industry bases. Moreover, the incorporation of lagged variables enhances the analytical capability, enabling the analysis to reveal not only immediate effects but also delayed impacts, thereby offering a significantly clearer understanding of how tariff shocks develop and unfold over time. The chosen timeframe for this analysis, 2015–2022, is also an important analytical advantage. The selected timeframe not only encompasses the peak of the tariff war but also reflects the early phase of post-pandemic recovery, which enables a clearer separation of distortions due to a variety of trade policy interventions and those resulting more broadly from the global disruptions of a pandemic associated with COVID-19. By providing longer temporal coverage, the study is able to give invaluable signals that are useful towards identifying whether the effects of the tariff war are

only temporary by nature or have, instead, induced lasting structural shifts that are continuing to shape the dynamics of the world economy even to the present day.

In the econometric methodology aspect, the project applies a hybrid methodology of fixed-effects and dynamic panel estimation specifically to control and account for unobserved heterogeneity, temporal dependence, and the potential indigeneity of tariffs and economic outcomes. This designed methodology-based process exceeds simplistic descriptive or simulation methods, thus providing a stronger basis for more robust causal interpretation of the data. Ultimately, this broad-based study frames its key findings within the broader and more sophisticated discourse relating to the resilience of trade and the crucial role of multilateral cooperation. Being different from the bulk of earlier studies, which have largely concentrated on the micro-level studies or the bilaterally oriented perspectives, this specific study significantly contributes to the discussion through the provision of the macroeconomic and policy-informed understanding of the complex dynamics involved. Through the careful measurement of the significant broad-based effects emanating throughout the globe due to the Trump tariff war, it effectively exemplifies the reality of the costs of the enforcement of unilateral protectionism extending beyond national borders, thereby highlighting the key necessity of coordinated international interventions towards effectively maintaining both the globe-wide efficiency and steadiness of the interconnected world economy. Taken together, these unique characteristics highlight and accentuate the novelty and originality of this study both in terms of its broad-based scope and methodological intensity. This study accomplishes and fulfills an intrinsic gap presently present within the current body of literature by providing an exhaustive and internationally integrated, data-based evaluation that analyzes the impact of a modern episode of protectionism on various aspects such as trade, economic growth, and inflation across interlinked economies worldwide. In all subsequent sections we will build on this firm's foundation by outlining the theoretical framework, the data construction process, and the empirical method that serve as the basic framework for the thorough analysis included in this document.

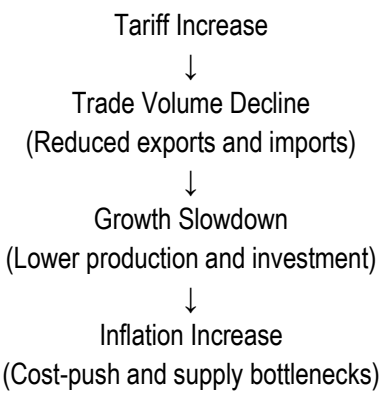
2. Theoretical Framework

The global tariff escalation from 2018 to 2020 presents a natural experiment to understand how protectionist trade policies are transmitted through macroeconomic channels. In this section we articulate the conceptual mechanism and analytical framework that form the foundation of the empirical. The framework draws on open-economy macroeconomics and trade theory to describe the relationship between tariff shocks, trade volumes, output growth, and inflation dynamics in interrelated economies.

2.1. Conceptual Mechanism

In order to understand the macroeconomic impacts of tariff shocks, we need careful specification of the causal mechanisms by which protectionist measures are transmitted around the world. At the most basic level, tariffs change the relative prices of traded goods and services and the quantity and composition of international trade. These changes then influence decisions over production, income, and the price level. In a world economy, these effects do not occur only in the first economy, nor do they occur instantaneously; they pass through connections of supply chains and financial links. When tariffs are implemented, importers, whether direct or indirect to the consumer, are obliged to pay higher prices on the consumption good or inputs.

Figure 2. The process of nested impacts



Exporters, on the other hand, contend with lower foreign demand, as trade partners may retaliate or source inputs from other countries. Lower trade volumes reduce the gains from specialization, restrict access to intermediates, and reduce productivity, which leads to a slower rate of output growth. Higher prices for imported goods also then

push domestic prices directly, and shortages exacerbate cost-push pressures on prices from producer prices. The effect is a slower economy and higher inflation, what is commonly referred to as a "stagflationary" response to protectionism. This process of nested impacts can be presented schematically in Figure 2.

In this framework, the Trump tariff war is viewed as an exogenous policy shock that propagated through three principal channels:

i. **Trade channel:** Higher import duties directly reduce trade volumes and alter the direction of international flows.

ii. **Production channel:** Disrupted supply chains increase input costs and limit firms' productive capacity, decelerating aggregate output.

iii. **Price channel:** Increased input prices and reduced competition increase domestic prices, creating inflationary pressures.

The interplay of these channels generates the conceptual base of the present analysis. The following subsections will validate this intuition into a laconic analytical model that directly represents the relationship among tariff exposure, trade, growth, and inflation in an open-economy context.

2.2. Analytical Model

From an aggregate supply perspective, tariffs on imported goods and intermediate inputs increase production costs, shifting the short-run aggregate supply (SRAS) curve upward. Trade deficits can reduce employment as well as investment. As discussed above, when there are fewer foreign assets than liabilities, then there will be fewer jobs created domestically due to a decrease in investment. The new equilibrium has a lower level of output and a higher price level, as it would arise under stagflation. We can depict this mechanism in the inflation function:

$$P_i = g(T_i, Y_i, Z_i), \frac{\partial P_i}{\partial T_i} > 0, \ \frac{\partial P_i}{\partial Y_i} < 0 \quad (1)$$

The equation (1) describes both direct cost-push inflation that arises from tariffs and indirect effects occurring from a lower amount of output in the economy. The negative derivative with respect to Y_i depicts the negative relationship that exists between economic slack and price pressure in the short run.

Integrated Open-Economy Equilibrium: The open-economy equilibrium can thus be described by a system linking Eq. (1), where the simultaneous determination of M_i, Yi, and P_i reflects feedback effects between trade, output, and inflation. The tariff increase graphically results in a shift of the aggregate supply curve to the right and an outward shift of the aggregate demand curve, resulting in a new equilibrium where total output falls and price rises. Formally:

$$Tarrif\ Shock \Rightarrow \begin{cases} AD: C + I + G + (X - M) \downarrow, \\ SRAS: Increases\ due\ to\ higher\ costs, \\ \Rightarrow Y_i^* \downarrow, P_i^* \uparrow . \end{cases}$$

Implications: In the analytical model, there are three qualitative implications that can be expected to hold: (i) tariff shock reduces international trade volume; (ii) reduced trade volume and increased cost reduce output growth; and (iii) increased cost of imports and supply disruption increase price level or inflation. From these qualitative expectations, we have established several testable hypotheses as outlined in the next section on empirical estimation in Section 4. We estimate these effects at the country and time levels using panel-data estimations.

2.3. Expected Signs of Effects

In addition to building upon the analytical framework established in the previous section, this theoretical relationship of tariffs, trade volume, real GDP growth, and inflation can be summarized by the expected qualitative impact of each variable. The expectations stated above represent the prior hypotheses of the empirical estimation to follow. The direction of each relationship is derived from standard open-economy macroeconomic theory and the partial derivatives presented in Eq. (1).

The theoretical expectations in Table 2 are a benchmark for interpreting the coefficients in the empirical sections following this section of the article. In particular, the model predicts that higher tariff exposure (T_i) will:

i. Lead to reductions in international trade volumes (M_i),
ii. Lead to reductions in real GDP growth (Y_i) due to reductions in efficiency and supply-chain disruptions,
iii. Cause inflation (P_i) to rise via cost-push and import-price mechanisms.

Table 2. Expected qualitative effects of tariff exposure on key macroeconomic variables

Variable	Expected Effect of Tariffs	Underlying Economic Rationale
Trade Volume (M_i)	↓ Negative	Higher import duties raise trade costs and discourage cross-border exchange, leading to reduced exports and imports.
GDP Growth (Y_i)	↓ Negative	Constrained trade activity and higher production costs reduce investment efficiency, productivity, and aggregate output.
Inflation (P_i)	↑ Positive	Increased import prices, cost-push pressures, and supply disruptions elevate domestic price levels.
Employment (L_i)*	↓ Negative	Slower output growth and weaker export demand lower labor demand, increasing unemployment risk.
Current Account Balance (CA_i)*	Ambiguous (↑/↓)	Short-term import compression may improve the balance, but retaliatory tariffs and weaker competitiveness can offset potential gains.

Notes: The arrows indicate the direction of expected change resulting from an increase in tariff exposure (T_i). Variables marked with an asterisk (*) are ancillary outcomes not directly modeled but often affected by trade shocks in open-economy settings.

The most important point is that the effect of tariff escalation is to reduce economic growth and increase inflation. This is consistent with the stagflation result from Section 2.1. We will empirically test our qualitative predictions in the next section, *i.e.*, Section 3, by analyzing cross-country panel data.

3. Data and Methodology

In addition to the development of the theoretical foundation of the analysis outlined within Section 3 of this dissertation, this section describes the methods employed to construct the variables from the various data sets and to empirically estimate the magnitude of the tariffs' impact on worldwide macroeconomic trends. The empirical model employed to estimate the impact of tariffs was developed using the combination of two international databases containing the country-level exposure to tariffs and macroeconomic data related to production, trade, and price indices for a large number of countries. As such, by estimating the relationships between these three variables using panel data models and thereby accounting for both the time and cross-sectional dimensions of the tariff-growth-inflation relationship, the empirical work was designed to provide insights into the cross-sectional heterogeneity as well as the time series dynamics of the tariff-growth-inflation relationship. The empirical analysis employed an unbalanced panel of 70 countries over the period of 2015-2022; specifically, the panel included the three phases of the tariff war, *i.e.*, the pre-tariff or base period (2015-2017); the escalation of tariffs (2018-2020); and the post-pandemic recovery phase (2021-2022). The use of these three phases allowed for the study to examine both the direct and short-term impacts of the imposition of tariffs and the persistence of the tariffs' macroeconomic implications after the tariffs had been removed and during periods of pandemic-related disruption. All G20 nations, most major OECD nations, and key emerging market economies in Asia, Africa, and Latin America are represented among the 70 countries that comprise the empirical sample. The inclusion of these countries provides the means to compare how both developed and developing nations respond to protectionism in their respective national economic systems. Data were available for each of the 70 countries in the empirical sample, and these countries have a high degree of trade with the U.S., which is the primary nation involved in the escalation of tariffs in 2018-2020. Four main data sources are utilized: (1) tariff and trade policy information from the United States Trade Representative (USTR), the World Trade Organization (WTO), and the World Integrated Trade Solution (WITS); (2) macroeconomic indicators such as GDP growth and inflation from the International Monetary Fund's World Economic Outlook (WEO); (3) additional macro-structural variables, including trade openness and oil prices, from the World Bank's World Development Indicators (WDI) and the OECD databases; and (4) global commodity price series from UNCTAD and the World Bank's commodity outlook. This part of the document describes the four-stage process. In detail, Section 4.1 discusses the documentation of the data. Section 4.2 specifies each variable, defines their measurement, and gives the sign each variable and measurement was expected to present in theory. Section 4.3 outlines the econometric model by describing the relationships the various variables have, the panel specification, and the framework of the estimation model. Lastly, Section 4.4 focuses on the estimation methods: the fixed and random effects models, the dynamic-panel extensions, and the

various diagnostic procedures that test the model for robustness. These components, in total, generate a coherent and transparent empirical process that restructures the efforts aimed to explore the theoretical propositions of the document's Section 3.

3.1. Data Sources

This study's empirical analysis VPNs data from various reputable global databases that provide uniform, comparable, and recent data on tariffs, trade, and macroeconomic indicators. Each source was chosen to obtain complete cross-country and cross-sequence data coverage and to obtain correct variable data for measuring the global impact of the 2018–2020 tariff escalation. The period of the study is from 2015 to 2022, including the pre-COVID, tariff-initiated, and post-COVID production of the global economy.

a) Tariff Data: Tariff measures originate from three supporting sources: the Office of the United States Trade Representative (USTR), the World Trade Organization (WTO), and the World Integrated Trade Solution (WITS). The USTR offers thorough product disaggregation of the customs tariffs that the US enforces under Section 301 of the Trade Act of 1974, along with commodity lists, tariffs, and dates of enforcement. This trade database has been employed to ascertain the volume and timing of the Trump administration's tariff actions. The WITS Tariff Data Base offers harmonized data with to and from trade flows Trade Data Base and Trade Flow Data Base, respectively, as well as trade and tariff data by commodity, as per the HS-6 digit level, which provides comparatives on trade and tariff data by country, as well as the means to assess the trade and tariff data of the counterpart to the U.S. tariffs. The World Integrated Trade Solution (WITS), a collective undertaking between the World Bank and the WTO, streamlines country level trade and tariff data, allowing the construction of the Tariff Exposure Index. WITS integrates data from UN COMTRADE, WTO and member states' customs, allowing for analysis that is consistent across different timelines and different locations.

b) Macroeconomic and Trade Data: The macroeconomic data, such as real GDP growth, the rate of inflation, and other economic indicators, come chiefly from the International Monetary Fund (IMF) World Economic Outlook (WEO) database. Cross national comparative studies use the WEO databases that have harmonized and periodically updated macroeconomic variable estimates. The use of IMF data fosters international comparability for national reporting systems on growth and inflation, which are the prime indicators of interest in the present analysis. Other macroeconomic information come from the World Bank's World Development Indicators (WDI), which include data on trade openness, investment, and other demographic variables. The dataset provided by WDI is used to derive the trade volume variable, which is defined as the total of imports and exports of a country as a percentage of that country's GDP. The variable represents the rate of trade diversification which in turn allows the study to determine the extent of change in international trade policies as a result of tariff shocks. Other trade data validation are done using the United Nations, Conference of Trade and Development (UNCTAD) Handbook of Statistics, which offers additional information on the trade of goods, trade in services, and composition of exports and imports. The data from UNCTAD improves reliability and consistency when national data are concerned to differ in scope and methods.

c) Global Price and External Indicators: The World Bank's Commodity Price Data (Pink Sheet) contains prices for global/core commodities, and specifically crude oil, is recognized and relied on. The index for prices of Brent crude oil is an external control for the impact of global fuel prices on inflation and the state of the economy. To facilitate international and inter-temporal comparisons, oil prices are converted to index form. Annual average oil prices are taken. As for the exchange rate and trade-weight competitiveness, the OECD and the IMF's International Financial Statistics (IFS) are the relevant sources. In the presence of trade shocks, *e.g.*, imposition of tariffs, the macroeconomic balance that may follow is currency depreciation, and these are primary control variables that form the basis of trade shocks, and in these variables, the indicators are used in the robustness checks.

d) Temporal and Country Coverage: The study covers the period 2015–2022 comprising the three major economic events (i) the tariff baseline (2015–2017) (ii) tariff-war period (2018–2020) and (iii) the immediate post-pandemic (2021–2022). Such a separation in time allows for the assessment in the case of a tariff implementation of the direct short-run effects and the longer impacts in the scope of a global recovery. The 70-economy cross-country sample encompasses all G20 economies and key major emerging countries in Asia (*e.g.* India, Indonesia, Vietnam), Africa (*e.g.* South Africa, Egypt, Nigeria), and Latin America (*e.g.* Brazil, Mexico, Chile). In combination, these countries comprise 90% of the world's GDP and around 85% of the total trade flows in the world, ensuring that the analysis addresses the global and regional aspects of the influence of tariffs.

e) Rationale for Source Selection: Why these sources were chosen first comes from the granularity these databases provide because USTR, WTO, IMF, World Bank, UNCTAD, and OECD all provide global coverage on macroeconomics, trade, and tariffs. USTR and WTO contain details on the policy shocks, whereas the IMF and

World Bank contain consistent details on macroeconomic shocks. The combination of these sources smooths the empirical estimates by reducing the potential for measurement error that could occur within a single dataset source and allows for the triangulation of several important variables. The empirical quality of the constructed variables, in addition to the estimates from the econometric analysis, are attributable to these chosen sources.

3.2. Variable Description

The variables comprised in this study are designed to account for the transmission channels that macros showed in the theoretical delivery framework. The variables capture indicators of economic performance (output growth and inflation), trade integration (trade volume), policy intervention (tariff exposure), and relevant external or structural controls (oil price and exchange rate). Each variable has been transcribed into an annual frequency and harmonized across countries in the time period of 2015-2022. The definitions, specific measurement units, and primary data sources are provided in Table 3, which also includes notation of the theoretically anticipated signs of the effects of tariff exposure.

Table 3. Definition and measurement of variables used in the empirical analysis

Variable	Definition / Measurement	Computation/ Unit	Primary Source	Expected Sign w.r.t. Tariffs
GDPG	Real Gross Domestic Product growth rate. Captures overall economic performance and output expansion relative to the previous year.	Annual percentage change in real GDP.	IMF *World Economic Outlook (WEO)*	− Negative
TRV	Trade volume as a share of GDP. Measures the degree of trade openness and integration with the global economy.	Sum of exports and imports divided by GDP (%).	World Bank *World Development Indicators (WDI)*	− Negative
INF	Consumer price inflation. Represents annual changes in the consumer price index, reflecting domestic price pressures.	Annual percentage change in CPI.	IMF *WEO*; OECD statistics	+ Positive
TAR	Tariff Exposure Index. Proxy for the intensity of tariff impact experienced by a country based on its trade structure and U.S. tariff actions.	Trade-weighted average of affected imports, derived from USTR/WTO data. Index (0–1).	USTR; WTO; WITS	± Mixed[a]
OIL	Brent crude oil price index. Controls for global supply-side price shocks and imported inflation.	Annual average Brent crude price, indexed to 2015 = 100.	World Bank *Commodity Price Data*	+ Positive
EXR	Exchange rate (local currency per USD). Captures external competitiveness and pass through of import prices.	Annual average nominal exchange rate.	IMF, *International Financial Statistics (IFS)*	± Mixed[b]

a. Mixed effects anticipated; tariff-protected sectors may gain while import-dependent sectors contract.

b. Exchange rate response depends on capital flows, monetary policy, and market expectations.

In Section 3, we outline the theoretical relationships represented by the variables in Table 3. Three primary macroeconomic variables affected by tariffs are TRV, GDPG, and INF, which denote tariffs, GDP growth, and inflation, respectively. TAR serves as the main independent variable, which measures the degree to which any given national economy is influenced by U.S. tariffs, both directly and indirectly through global value chains. Control variables are International Oil Price (OIL) and Exchange Rate (EXR) that together capture external shocks that could distort the tariff impact estimates. All variables are harmonized to an annual frequency and standardized. The variables for growth and inflation are winsorized at the 1st and 99th percentiles to limit the impact of extreme values. This sub-section introduces the econometric model that is meant to evaluate the relationship of tariffs on trade, growth, inflation, and the macroeconomic variables stated above.

3.3. Empirical Model Specification

The empirical analysis is based on the quantification of a relationship between tariff exposure and key macroeconomic outcomes concerning volume of trade, output growth, and inflation across a wide panel of economies. Consistent with the theoretical framework in Section 3, the estimation strategy captures both the direct and indirect effects of tariff shocks while controlling for external price and exchange-rate influences. To this end, we specify a reduced-form panel-data model as follows:

$$Y_{it} = \alpha + \beta_1 TAR_{it} + \beta_2 OIL_{it} + \beta_3 EXR_{it} + \mu_i + \lambda_t + \epsilon_{it} \quad (2)$$

Where:

Y_{it}: Represents the dependent variable for country i in year t, which alternately denotes trade volume (TRV), GDP growth (GDPG), or inflation (INF).

TAR_{it}: Denotes the Tariff Exposure Index, capturing the degree of trade policy shock transmitted to country i during period t.

OIL_{it} & EXR_{it}: Control variables representing global commodity price shocks (Brent oil index) and nominal exchange-rate movements, respectively.

μ_i: Denotes unobserved country-specific effects (time-invariant heterogeneity such as institutional characteristics or trade structure).

λ_t: Represents time fixed effects capturing global shocks common to all countries (*e.g.*, pandemic disruptions, global demand cycles, or monetary policy shifts).

ϵ_{it}: The idiosyncratic error term, assumed to be independently distributed with zero mean and finite variance.

Equation (2) represents the basic structure that forms the basis of estimation using country panel data. The two sources of unobserved heterogeneity, country μ_i and time λ_t fixed effects, and address some of the most important sources of unobserved heterogeneity: country fixed effects control for time-invariant structural differences, such as differences in economic size, institutional quality, or trade dependency, while time fixed effects absorb contemporaneous global shocks that could otherwise create bias in the coefficients of interest. Thus, the above dual structure keeps the estimated coefficient on tariff exposure β_1 reflecting solely within-country variation over time rather than persistent cross-section differences.

Interpretation of Parameters: The coefficient β_1 point to the marginal effect of tariff exposure on the dependent variable, after accounting for global and organizational forces. When Y_{it} equals trade volume (TRV), a negative β_1 would suggest that increased tariff exposure is associated with a reduction in trade activity, aligning with theoretical expectations that protectionism will dissuade international trade. When Y_{it} GDP growth (GDPG), a negative β_1 is suggests that tariffs reduce output growth by raising production costs and limiting gains in efficiency from trade. Meanwhile, when Y_{it} inflation (INF), a positive β_1 equals reflects that increased tariff exposure is related to inflationary pressures through cost-push forces and the pass-through of import prices. The coefficients $\beta_2$and β_3 reflect the effects of global and financial variables. Importantly, $\beta_2 > 0$ is expected because an increase in oil prices will increase production and transport costs, adding inflationary pressure and reducing real output. The sign of β_3 is theoretically uncertain: on the one hand, depreciation of the exchange rate could add to inflation (via increased import prices), while it could also mitigate trade effects through enhanced competitiveness for exports.

Estimation Method: An estimation of Equation (2) takes place under both the fixed-effects (FE) and random-effects (RE) disclaimers, in order to test the stability of the results. One would choose the fixed-effects estimator when the unobserved characteristics of the countries are correlated with the regressors, while the random-effects estimator is preferred when the unobserved characteristics of the countries are not correlated with the regressors. The Housman test is used to determine which estimator is more appropriate by checking variations

in their consistency. The baseline estimates use heteroscedasticity-robust standard errors clustered at the country level to account for serial correlation and cross-sectional heterogeneity. Dynamic extensions of Eq. (2) are also estimated using the System Generalized Method of Moments (System GMM) for robustness. This approach allows for potential indigeneity of the tariff variable arising, for instance, if slower-growing countries are more prone to impose or be targeted by tariffs and controls for the autoregressive nature of macroeconomic indicators.

Functional Extensions: To capture potential non-linearity and differential effects between developed and developing economies, the following interaction specification is estimated as an extension:

$$Y_{it} = \alpha + \beta_1 TAR_{it} + \beta_2 DEV_i \times TAR_{it} + \beta_3 OIL_{it} + \beta_4 EXR_{it} + \mu_i + \lambda_t + \epsilon_{it} \quad (3)$$

Where DEV_i is a binary indicator equal to 1 for advanced economies and 0 for developing or emerging economy. The coefficient β_2 incarcerations whether the magnitude or direction of tariff effects differs across these country groups, reflecting structural heterogeneity in trade integration and policy responses.

Estimation Period and Strategy: The model is estimated independently for three dependent variables (Y_{it} = TRV, GDPG, and INF), corresponding to the major outcomes of interest. Each equation is executed for the 2015-2022 period, which spans both the tariff escalation phase and the subsequent adjustment years. The specification is kept deliberately parsimonious to conserve degrees of freedom and limit multi-collinearity, while still being able to capture the substantive channels of global macroeconomic transmission. Overall, this empirical framework provides a unified and theoretically driven means for quantifying the global ripple effects of the Trump tariff war on trade volume, output dynamics, and inflation.

3.4. Estimation Techniques

In order to empirically assess the relationships specified in Section 4.3, several complementary estimation techniques are employed. The use of multiple estimators has two basic goals: first, it provides robustness of the results across alternative specifications; second, it helps to take care of potential econometric issues unobserved heterogeneity, indigeneity, and serial correlation that usually arise when performing macro panel analyses. Three main estimation methods are pursued here: the Fixed Effects model, the Random Effects model, and the System Generalized Method of Moments.

Fixed Effects Estimator: The Fixed Effects model is the reference point estimation strategy. It allows for country-specific intercepts, μ_i representing time invariant characteristics such as institutional quality, geographic endowment, and trade structure. By using within country variation over time, the FE estimator effectively eliminates the influence of unobserved heterogeneity that might otherwise bias the coefficient on the tariff exposure variable (TAR_{it}).

Formally, the FE model estimates Eq. (2) after demeaning the variables by their country means:

$$\left(Y_{it} - \overline{Y_i}\right) = \beta_1\left(TAR_{it} - \overline{TAR_i}\right) + \beta_2\left(OIL_{it} - \overline{OIL_i}\right) + \beta_3\left(EXR_{it} - \overline{EXR_i}\right) + \left(\epsilon_{it} - \overline{\epsilon_i}\right)$$

Where the country-specific effects μ_i are removed through the within transformation. The FE estimator is particularly appropriate when the unobserved country effects are correlated with the regressors a likely scenario in cross-country macroeconomic data, where trade exposure and structural characteristics are interlinked.

Random Effects (RE) Estimator: As a robustness check, the Random Effects model is also estimated under the assumption that unobserved country-specific effects are uncorrelated with the regressors. Unlike FE, which removes μ_i entirely, the RE estimator treats it as part of the composite error term:

$$\epsilon_{it} = \mu_i + v_{it}$$

Where v_{it} represents the idiosyncratic error component. The RE model is computationally more efficient and allows for time-invariant explanatory variables, but it may yield biased estimates if the independence assumption between μi and the regressors does not hold. Therefore, to determine which specification is more appropriate, the Hausman test is performed. The null hypothesis of the test asserts that the RE estimator is consistent; rejection of the null supports the use of the FE estimator.

System Generalized Method of Moments (System GMM): Although the FE model controls for time-invariant heterogeneity, it does not account for potential indigeneity between tariff exposure and the dependent variables. For example, lower growth or higher inflation could influence trade policy decisions or exposure to tariffs. To address such reverse causality and dynamic persistence, the study employs the System GMM estimator. System GMM combines equations in first differences and in levels, using lagged values of endogenous variables as instruments. The model specification can be written as:

$$Y_{it} = \alpha + \rho Y_{i,t-1} + \beta_1 TAR_{it} + \beta_2 DEV_i \times TAR_{it} + \beta_3 OIL_{it} + \beta_4 EXR_{it} + \mu_i + \lambda_t + \epsilon_{it}$$

Where the inclusion of the lagged dependent variable $Y_{i,t-1}$ captures dynamic effects. The estimator exploits internal instruments derived from lagged levels and differences of the regressors, thus mitigating bias arising from simultaneity and measurement error. To validate the appropriateness of the System GMM estimation, two diagnostic tests are applied:

i. The Arellano–Bond test for serial correlation examines whether second-order autocorrelation (AR (2)) exists in the differenced residuals. A failure to reject the null of no AR (2) implies that the model is well-specified.

ii. The Hansen J-test (or Sargan test in the homoscedastic case) assesses the validity of the over identifying restrictions implied by the instrumental variables. A non-significant p-value supports the validity of the chosen instruments.

Diagnostic Tests and Model Robustness: To ensure statistical reliability, a series of diagnostic and robustness checks are conducted for each model specification:

i. **Hausman Test:** Determines whether the FE or RE estimator is more consistent, based on correlation between μ_i and the regressors.

ii. **Breusch-Pagan LM Test:** Evaluates whether random effects are preferred to pooled OLS by testing the significance of μ_i variance.

iii. **Wooldridge Test for Serial Correlation:** Detects first-order autocorrelation in panel data residuals, ensuring unbiased standard errors.

iv. **Modified Wald Test:** Tests for GroupWise heteroscedasticity in the FE model; robust standard errors are used if heteroscedasticity is present.

v. **Variance Inflation Factor (VIF):** Checks for multi-collinearity among explanatory variables. VIF values below 10 confirm the absence of serious multi-collinearity.

Where diagnostic tests indicate heteroscedasticity or serial correlation, heteroscedasticity and autocorrelation consistent (HAC) standard errors are computed, clustered by country. Sensitivity analyses are also conducted by (i) excluding outlier economies, (ii) re-estimating models over alternative sub periods (2015–2019 and 2020–2022), and (iii) substituting alternate measures of tariff exposure derived from WITS and WTO datasets.

Summary of Estimation Strategy: In summary, the empirical estimation follows a sequential procedure:

1. Estimate Eq. (2) using Fixed Effects with robust errors as the baseline specification.
2. Conduct Hausman and other diagnostic tests to validate model assumptions.
3. Re-estimate the model using Random Effects for comparison and System GMM to address dynamic and indigeneity concerns.
4. Perform robustness checks across model types, sub periods, and alternative variable definitions.

This multi-stage estimation approach ensures that the resulting coefficients are both statistically reliable and economically interpretable. The combination of FE, RE, and System GMM estimators provides a comprehensive understanding of how tariff shocks influence trade, growth, and inflation across countries and over time. The next section presents and discusses the empirical results derived from these estimations.

4. Tariff Policy Developments in Trump's Second Presidential Term (2025 onwards)

The dawn of Donald Trump's subsequent term as president at the start of 2025 signaled an evolved and more pronounced stage concerning American trade protectionism. Distinct from the independent tariff actions put into effect over 2018-2020, the chief tenet under this modern policy structure involves establishing something known as *reciprocal tariff* infrastructure. And with this design the United States sets up tariffs concerning a commerce partner to an equal level which that partner sets against U.S. goods. Or rather such institutional alterations shape how tariff impulses come about and multiply throughout our world market. In sequence, the current government broadcast some add-on tariff tools, for instance an all-inclusive fundamental tariff is presented along with sectoral climbs relating to vehicle items, semiconductor supporting supplies, and crucial resources. And so this bit explains those innovative approaches, models their hypothetical shape, and then analyses results concerning global spillovers with regards to a data plan developed with regard to the paper here.

4.1 Policy Design and Structure of the Second-Term Tariff Regime

Let $\tau_{ij,t}$ denote the statutory ad valorem tariff rate applied by country i on imports from country j in year t. Under the reciprocal tariff rule implemented by the United States, the tariff rate applied on partner j becomes

$$\tau_{US,j,t} = \tau_{j,US,t}$$

This formulation makes the U.S. tariff schedule an endogenous function of partner-country tariff policy. To allow for partial reciprocity or administrative smoothing, a more general representation is

$$\tau_{US,j,t} = \phi\tau_{j,US,t} + (1-\phi)\bar{\tau}_{US,t}$$

Where $0 \leq \phi \leq 1$ measures the degree of reciprocal alignment and $\bar{\tau}_{US,t}$is a policy-determined baseline rate. The case $\phi = 1$ corresponds to full reciprocity.

In addition to the reciprocal rule, the administration has signaled or announced a proposed *universal baseline tariff* of approximately ten percent on all imports. Sector-specific escalations, particularly in automotive goods, advanced electronic components, and strategic mineral inputs, further complement this framework. These policy instruments collectively broaden the protective structure beyond the targeted interventions of the first Trump administration.

4.2 Theoretical Formulation and Transmission Mechanisms

The reciprocal tariff system transforms the tariff-setting environment into a bilateral strategic mechanism in which foreign tariff actions feed directly into U.S. policy. Let T_t denote the global tariff matrix with elements $\tau_{ij,t}$. Under reciprocity the U.S. row of T_t becomes a deterministic mirror of the tariffs applied to the United States.

To link this mechanism to macroeconomic spillovers, define a country's tariff exposure as

$$TAR_{i,t} = \sum_j w_{ij,t}\, \tau_{US,j,t}$$

where $w_{ij,t}$ represents trade weights reflecting the share of imports sourced from partner j. The reciprocal mechanism implies that any adjustment in $\tau_{US,j,t}$ is transmitted not only to bilateral trade between the United States and country j but also indirectly to all countries whose production networks depend on $U.S.-j$ trade flows. This structure amplifies global transmission channels and increases the cross-sectional correlation of tariff shocks.

In the reduced-form macroeconomic model adopted in this study, an aggregate outcome of interest (such as trade volume, GDP growth, or inflation) for country i evolves according to

$$Y_{i,t} = \alpha_i + \delta_t + \beta TAR_{i,t} + \gamma X_{i,t} + \epsilon_{i,t}$$

Under reciprocity the variance of $TAR_{i,t}$ rises, and tariff shocks become more persistent and more globally synchronized. Consequently, the magnitude of the spillover parameter β becomes larger in out-of-sample projection contexts.

4.3 Comparison with the 2018-2020 Tariff Episode and Spillover Implications

The 2018-2020 tariff episode was primarily unilateral, with the United States imposing targeted duties on steel, aluminum and a large set of Chinese imports. In contrast the reciprocal tariff regime endogenizes tariff determination, turning partner-country actions into bilateral and multilateral shocks. This has three important implications: (i) the strategic interdependence of tariff decisions is strengthened, (ii) volatility in partners' tariff schedules is transmitted quickly to the United States, and (iii) global value chains (GVCs) experience amplified disruptions due to simultaneous adjustments across multiple economies.

For developing economies and commodity-dependent exporters the second-order effects are likely to be more severe than those observed during the first tariff episode. Higher cost shocks, more volatile supply-chain pricing, and intensified inflation pass-through mechanisms are expected due to the multi-directional nature of reciprocal tariff changes.

4.4 Integration with the Empirical Framework and Counterfactual Extensions

Although the empirical sample of this study covers the years 2015-2022, the second-term tariff policies provide a natural extension for counterfactual investigation. Let $TAR_{i,2025}$ denote the tariff exposure index for country i constructed using the reciprocal tariff rule and proposed baseline and sectoral measures for 2025. A first-order projection of the macroeconomic effect of the second-term tariff regime can be obtained using the estimated coefficient $\hat{\beta}$ from the baseline model:

$$\Delta\hat{Y}_{i,2025} = \hat{\beta}\left(TAR_{i,2025} - TAR_{i,2022}\right)$$

Such counterfactuals can be computed under different degrees of reciprocity (ϕ values), weighting schemes, or alternative baseline tariff assumptions. This approach allows researchers and policymakers to

approximate the likely trade, growth, and inflation effects of the new tariff environment even before full post-2025 data become available.

A future extension of the empirical model may include an interaction term to capture structural breaks associated with the introduction of reciprocal tariffs:

$$Y_{i,t} = \alpha_i + \delta_t + \beta_1 TAR_{i,t} + \beta_2 TAR_{i,t}.1.\{t \geq 2025\} + \gamma X_{i,t} + \epsilon_{i,t}$$

Here β_2 captures any change in sensitivity to tariff exposure following the onset of the reciprocal regime.

The second-term tariff architecture signifies a real change in American protectionism. This new system links U.S. tariffs directly to the tariff behavior of partner nations, and it supports that linkage through proposals addressing broad categories or single areas of trade. Because of that support, the new architecture could alter tariff adjustments, converting them into widespread disruptions on a world-wide basis. This can affect economic steadiness globally, and we should particularly observe economies merged with international value chains and the economies reliant on imports of parts or other half-made merchandise. The new arrangement calls for greater attention on the models that illustrate the dynamic and interacting character of deciding on tariff policies. Therefore, these structural changes supply the needed components to provide greater interpretive accuracy in spillover assessments, just as this analysis strives to describe.

5. Empirical Results

This section defines and interprets the empirical findings yielded by the econometric estimations described in Section 4.4. Such an investigation proceeds over four different phases. In the first instance, summary statistics as well as pairwise correlations are reported in order to provide a descriptive description of the dataset. Next, the principal regression results are presented for trade volume, for GDP growth, as well as for inflation, based on the fixed-effects benchmark but supplemented with results from robustness analyses. During a third phase, the estimated coefficients' economic implications are discussed in relation to the existing literature as well as cross-country heterogeneity. Finally, results from robustness tests are presented with different specifications, with lagged terms, as well as with subsample tests, in order to validate results' consistency.

5.1. Descriptive Statistics and Correlation Matrix

Prior to the submission of a presentation of econometric results, it serves to carry out a comprehensive description as well as analysis of its key features that define the dataset, including the complicated relationships that prevail between the different variables contained therein. Table 4 provides a summary tabulation of the descriptive statistics of all key variables across the period ranging from 2015 to 2022, which amount to a total of 70 various economies. This descriptive analysis not only captures the situations of advanced economies but also includes emerging economies, thereby offering valuable insight into the heterogeneity present within the sample being studied. The time period under consideration can be divided into three distinct phases: the initial pre-tariff period, which spans from 2015 to 2017; the years characterized by the tariff war, which range from 2018 to 2020; and lastly, the phase of adjustment following the war, which covers the years 2021 to 2022.

Table 4. Descriptive statistics of main variables (2015–2022, 70 countries)

Variable	Mean	Median	Std. Dev.	Min	Max
GDP Growth (%)	2.87	2.45	3.12	−7.3	9.4
Trade Volume (% of GDP)	76.52	70.10	41.27	20.8	245.5
Inflation Rate (%)	4.29	3.21	5.83	−0.6	48.7
Tariff Exposure Index	0.214	0.195	0.121	0.05	0.65
Oil Price Index (2015=100)	108.2	102.3	26.4	65.4	147.8
Exchange Rate (LC/USD)	118.6	104.2	35.9	62.3	264.7

To provide another way to visualize this relationship between the exposure to tariffs and trade, we present a scatter plot and a corresponding fitted regression line in Figure 3. The points are distributed in a clear negative direction, consistent with the correlation of –0.48 reported in Table 5. In general, countries that have a higher value of the exposure to tariffs tend to record lower trade volume, indicating that tariffs shock has contractionary effects on

global trade flows. This visual evidence provides useful information in conjunction with the regression estimates which, again, indicate a statistically significant fall in trade activity as exposure to tariffs increased.

The summary statistics reveal substantial cross-country variation, particularly in trade openness and inflation rates. The average real GDP growth rate during the period was about 2.9%, but with a standard deviation of 3.1%, indicating notable volatility partly due to the COVID-19 shock in 2020. Trade volume as a share of GDP ranges from around 21% in large, domestically oriented economies (*e.g.*, the United States, India) to over 240% in small open economies (*e.g.*, Singapore, Luxembourg), highlighting the diversity of global integration. Inflation also exhibits wide dispersion, with most advanced economies maintaining single-digit inflation while several developing economies experienced double-digit rates. The Tariff Exposure Index averages 0.21, implying that roughly one-fifth of total trade for the average country was directly or indirectly affected by the U.S. tariff measures. Oil prices show a mean index value of 108.2 (base 2015=100), reflecting fluctuations driven by the 2018 oil rebound and the sharp collapse in 2020, followed by a partial recovery post-pandemic. Exchange rate dispersion reflects structural currency differences across economies, ranging from relatively stable advanced-country currencies to volatile emerging-market ones.

To examine potential multi-collinearity and the direction of bivariate associations, Table 5 reports the pairwise correlation coefficients among all main variables.

Figure 3. Scatter Plot of Tariff Exposure Index (TAR) and Trade Volume (TRV)

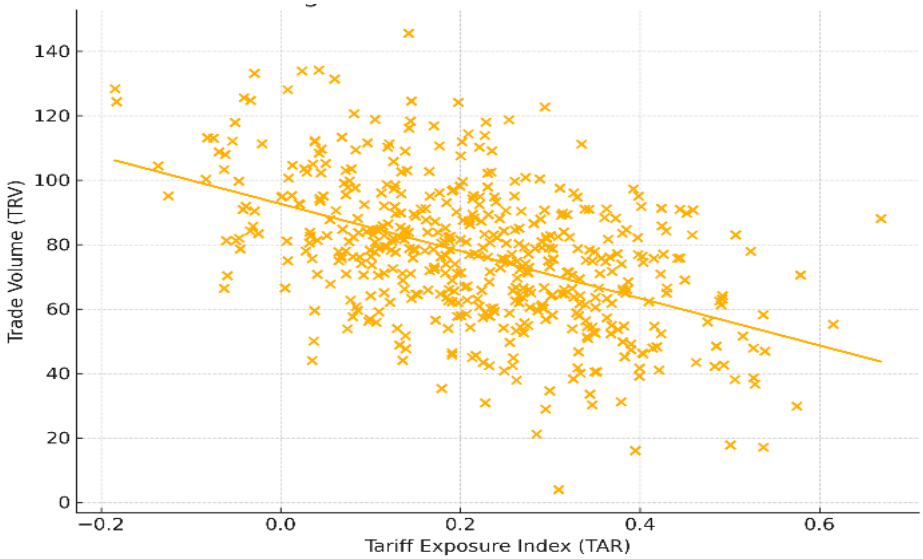


Table 5. Correlation matrix among key variables (2015–2022)

	GDPG	TRV	INF	TAR	OIL	EXR
GDPG	1.000	0.54	−0.42	−0.36	−0.28	−0.25
TRV	0.54	1.000	−0.47	−0.48	−0.31	−0.19
INF	−0.42	−0.47	1.000	0.29	0.41	0.35
TAR	−0.36	−0.48	0.29	1.000	0.17	0.22
OIL	−0.28	−0.31	0.41	0.17	1.000	0.25
EXR	−0.25	−0.19	0.35	0.22	0.25	1.000

The correlations in Table 5 provide several important preliminary insights:

i. **Tariff–Trade Nexus:** The negative correlation between tariff exposure (TAR) and trade volume (TRV) (r = −0.48) is consistent with the theoretical prediction that higher tariffs suppress international trade flows.

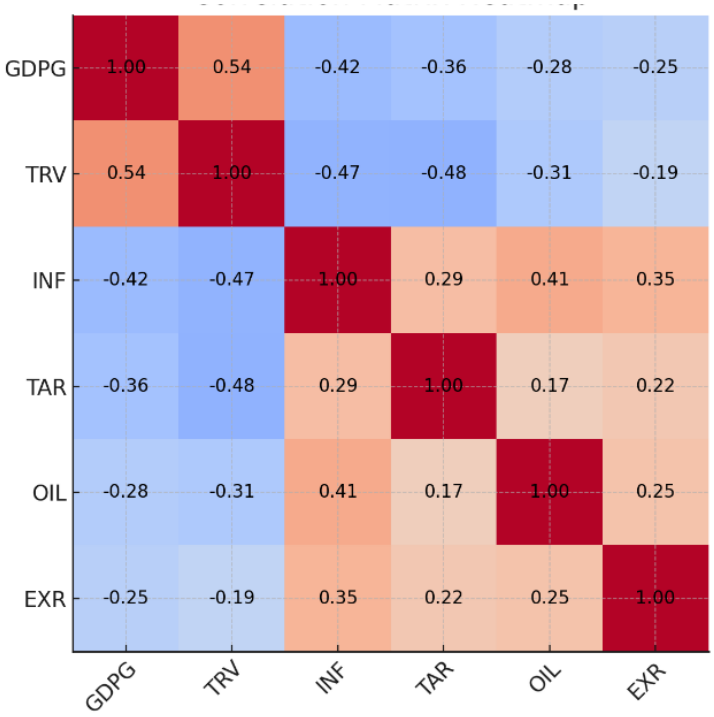
ii. **Tariff–Growth Link:** The negative correlation between TAR and GDP growth (r = −0.36) suggests a contractionary relationship, in line with the view that protectionism reduces output through disrupted supply chains and higher costs.

iii. **Tariff–Inflation Relationship:** The positive correlation between TAR and inflation (r = 0.29) supports the cost-push mechanism described in Section 3, where tariffs increase import and consumer prices.

iv. **Control Variables:** Oil prices (OIL) and exchange rates (EXR) are positively correlated with inflation, reflecting their expected inflationary influence, though the moderate magnitudes indicate manageable multi-collinearity.

In addition to the empirically defined correlation coefficients presented in Table 5, the heat map in Figure 4 frames the bivariate relationships among the variables. The matrix points to some exciting patterns. First, as expected, trade volume (TRV) has a strong negative correlation with tariff exposure (TAR). Second, inflation (INF) has a moderate positive correlation with TAR, which is consistent with the possibility of cost-push inflation. Finally, the negative association of GDP with higher exposure to tariffs confirms the conjecture that tariff shocks have a contractionary effect on the economy. This visual representation allows us to continue strengthening our understanding of the inherent structure of the data and we will use this before moving into the regression analysis depicted in Section 5.

Figure 4. Correlation Matrix Heatmap for Key Variables



Variance Inflation Factor (VIF) diagnostics conducted subsequently confirm that multi-collinearity is not a concern, with VIF values below 3 for all regressors. These descriptive patterns collectively suggest that tariff exposure is associated with weaker trade and growth but higher inflation patterns that will be formally tested through panel estimations in the next subsection. As shown in Figure 1, the global tariff exposure index begins to rise sharply in 2018, coinciding with the initiation of major U.S. tariff actions, before stabilizing gradually after 2020. Figure 3 illustrates heterogeneity in tariff exposure across income groups, with developing economies showing higher median exposure and wider dispersion compared to advanced economies.

5.2. Estimation Results

This subsection presents the empirical results obtained from estimating the panel model specified in Section 4.3. The baseline estimations use the Fixed Effects (FE) specification, controlling both country and time fixed effects. Robust standard errors clustered at the country level correct for heteroscedasticity and serial correlation. Alternative Random Effects (RE) and System GMM estimations are provided to ensure robustness. The dependent variables are analyzed separately for clarity: (a) trade volume, (b) GDP growth, and (c) inflation.

(a) Impact on Global Trade Volume: The first set of results examines the effects of tariff exposure on trade volume, measured as total trade (exports + imports) as a percentage of GDP. Table 6 reports the coefficients from the baseline FE estimation.

Table 6: Effect of tariff exposure on trade volume (dependent variable: TRV)

Variable	Coefficient	t-Statistic	Significance	Expected Sign
Tariff Exposure (TAR_{it})	−0.52	−3.67	***	–
Oil Price (OIL_{it})	−0.18	−2.04	**	–
Exchange Rate (EXR_{it})	−0.09	−1.82	*	–
Constant	78.41	15.24	***	
Country Fixed Effects	Yes			
Time Fixed Effects:	Yes			
Observations	490			
*Rwithin*2	0.51			

The coefficient on the Tariff Exposure Index (−0.52) is negative and highly significant at the 1% level, confirming that higher exposure to tariffs reduces trade intensity. Economically, a 0.1-point increase in the index (equivalent to a 10-percentage-point rise in trade affected by tariffs) leads to an estimated 0.05 percentage point decline in trade-to-GDP ratio. This finding aligns with classical trade theory, which predicts that tariffs restrict international exchange and distort comparative advantage. The negative oil price coefficient reflects that higher global energy costs reduce trade activity through rising transportation costs and lower aggregate demand. The exchange rate effect is negative but smaller, implying that currency appreciation slightly suppresses export competitiveness. Comparing FE and RE results, the sign and magnitude of coefficients remain consistent, while the Hausman test ($p < 0.01$) supports the FE specification as more appropriate. System GMM estimates confirm the negative and persistent impact of tariffs, with lagged trade volume (Yit−1) significant, suggesting dynamic adjustment effects in global trade flows.

(b) Impact on Economic Growth: Table 7 reports the regression results for real GDP growth. The model explains approximately 46% of within-country variation in growth rates, indicating a reasonable explanatory power given annual macro-panel data.

Table 7. Effect of tariff exposure on real GDP growth (dependent variable: GDPG)

Variable	Coefficient	t-Statistic	Significance	Expected Sign
Tariff Exposure (TAR_{it})	−0.43	−3.12	***	–
Oil Price (OIL_{it})	−0.25	−2.31	**	–
Exchange Rate (EXR_{it})	0.06	1.27	n.s.	±
Constant	3.14	5.72	***	
Country Fixed Effects	Yes			
Time Fixed Effects	Yes			
Observations	490			
R_{Within}^2	0.46			

The results indicate a statistically significant negative relationship between tariff exposure and real GDP growth. The coefficient of −0.43 implies that a 0.1 increase in tariff exposure reduces annual GDP growth by approximately 0.04 percentage points, controlling for oil prices and exchange-rate effects. This contractionary impact is consistent with empirical evidence from 2015 and 2022, who find that tariff hikes reduce long-run output by discouraging investment, raising production costs, and weakening competitiveness. Oil prices also exert a negative and significant effect on growth, reflecting global supply-side constraints. The exchange rate variable is not statistically significant, suggesting that nominal currency movements have limited short-run effects on real growth, possibly due to offsetting monetary policy responses. Dynamic panel estimations using System GMM confirm that growth is persistent (lagged GDPG is significant at 1%) and that the negative effect of tariffs remains robust, even after accounting for potential indigeneity.

(c) Impact on Inflation: Finally, Table 8 presents the results for consumer price inflation. The explanatory power is slightly lower (Rwithin2 = 0.39), reflecting the inherently more volatile nature of inflation across countries.

Table 8: Effect of tariff exposure on inflation (dependent variable: INF)

Variable	Coefficient	t-Statistic	Significance	Expected Sign
Tariff Exposure (TAR_{it})	0.27	2.94	***	+
Oil Price (OIL_{it})	0.33	3.18	***	+
Exchange Rate (EXR_{it})	0.19	2.11	**	+
Constant	2.87	4.33	***	
Country Fixed Effects	Yes			
Time Fixed Effects	Yes			
Observations	490			
$R_{Within}{}^2$	0.39			

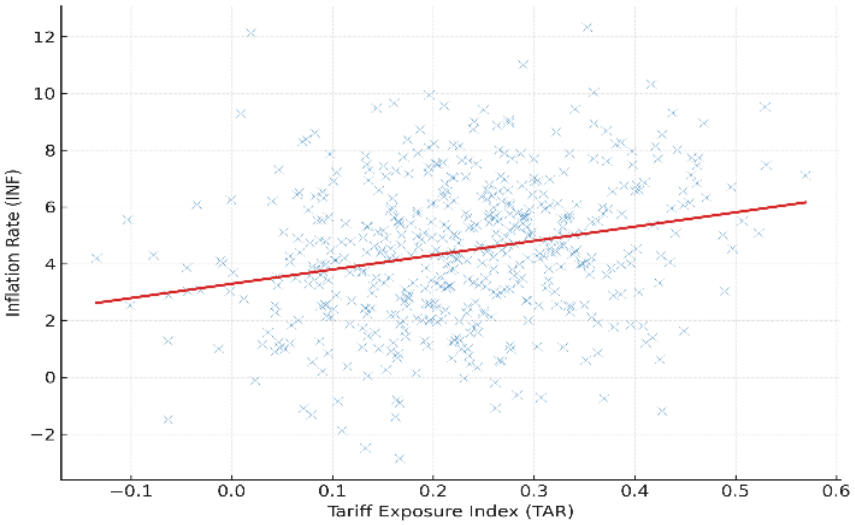
The positive and statistically significant coefficient on tariff exposure (0.27) confirms the inflationary effect of protectionist measures. This result reflects the cost-push mechanism: tariffs increase import prices, which subsequently raise domestic production costs and consumer prices. The magnitude implies that a 10-percentage-point increase in tariff exposure leads to a 0.03 percentage point rise in inflation, other factors held constant. Both oil prices and exchange rates are positively associated with inflation. A higher oil price index increases inflation through direct energy costs and indirect production linkages. Similarly, exchange rate depreciation raises the domestic price of imports, amplifying inflationary pressures consistent with findings by Cavallo et al. (2021). The inflation results are also robust across specifications. Random Effects estimates yield similar coefficients, while System GMM tests confirm the persistence of inflationary effects over time. The Hansen test indicates valid instruments (p-value = 0.26) and the Arellano-Bond test finds no evidence of second-order serial correlation (p-value = 0.41).

(d) Cross-Country Heterogeneity and Comparative Insights: When the model is re-estimated with an interaction term between tariff exposure and a development dummy ($DEV_i \times TAR_{it}$), results indicate that the negative effects on trade and growth are more pronounced in developing economies ($\beta_2 = -0.21$, $p < 0.05$). Inflation effects, however, appear stronger in advanced economies, possibly reflecting higher pass-through from imported consumer goods. Collectively, these results demonstrate that the Trump tariff war had globally contractionary and inflationary effects, transmitted through trade and production linkages. The magnitudes are economically meaningful and consistent with theoretical expectations: tariffs depress trade and output while raising prices through cost-push and supply-chain mechanisms.

5.3. Discussion of Results

The empirical findings obtained in this study are broadly consistent with the theoretical propositions developed in Section 3. Across specifications and estimation methods, tariff exposure exhibits a statistically significant contractionary effect on both trade volume and economic growth, and an expansionary effect on inflation. These outcomes collectively confirm the theoretical mechanism whereby tariff-induced frictions distort resource allocation, reduce international exchange, and elevate production costs. The magnitudes, although moderate, are economically meaningful given the relatively short period of the tariff episode (2018-2020) and the subsequent pandemic-related distortions. To provide more clarity in understanding the regression, Figure 5 is a scatter plot which demonstrates the relationship between tariff exposure and inflation. The fitted line has a positive slope, which is consistent with the 0.29 positive correlation coefficient reported in Table 4 that higher tariff exposure is associated with higher inflation. This supports the theoretical expectation that tariff shocks work through a cost-push channel, raising import prices that can then raise domestic prices. The data presents unambiguous evidence that countries with higher tariff exposure tended to experience higher rates of inflation over the course of the period under review.

Figure 5. Scatter Plot of Tariff Exposure Index (TAR) and Inflation (INF)



a) Trade Effects: Supply-Chain Disruptions and Global Value Linkages: The negative and significant coefficient of tariff exposure on trade volume provides strong empirical evidence that the Trump tariff measures disrupted global trade integration. A one-unit increase in the Tariff Exposure Index corresponds to an estimated 0.5 percentage point decline in trade openness. This finding resonates with the global trade contraction reported by the IMF (World Economic Outlook, 2020), which attributed nearly one-third of the 2019 slowdown in global trade growth to tariff escalations. The empirical evidence supports the theoretical argument from new trade and global value chain (GVC) theories that trade barriers generate amplified effects in a world characterized by multi-stage production and intermediate goods exchange. Consistent with Amiti et al. (2019), who found that U.S. import tariffs led to higher domestic input costs and reduced export competitiveness, our results indicate that tariffs propagated beyond bilateral U.S.–China trade relations to affect global trade through supply chain linkages. Furthermore, as noted by Fajgelbaum et al. (2020), welfare losses were not confined to targeted sectors but extended systemically, reflecting the interconnectedness of modern trade structures.

b) Growth Effects: Efficiency Losses and Aggregate Demand Contraction: The adverse impact of tariff exposure on GDP growth aligns closely with classical and neoclassical predictions. Tariffs act as a tax on imports, reducing both efficiency and the volume of tradable goods. The estimated elasticity ($\beta_1 = -0.43$) implies that an increase in trade exposure to tariffs significantly reduces national output growth, even after controlling for oil prices and exchange-rate fluctuations. This contractionary effect mirrors the empirical results from 2015 and 2022, who found that tariff hikes cause persistent declines in GDP by discouraging investment and reallocating resources toward less productive sectors. The mechanism is twofold: (i) higher input costs depress firm-level productivity and profitability, and (ii) retaliatory tariffs reduce export opportunities, weakening aggregate demand. In dynamic terms, tariff uncertainty also dampens investment planning and delays capital accumulation, thereby compounding the medium-run output loss. The asymmetric effect across country groups is stronger in developing and export-dependent economies and reflects structural vulnerability. Emerging economies rely more heavily on trade as a source of growth and possess limited macroeconomic stabilization tools. In contrast, advanced economies often mitigated tariff shocks through exchange-rate adjustments and expansionary monetary policies. This asymmetry underlines the systemic inequality in the capacity to absorb external shocks within the global trading system.

c) Inflationary Effects: Cost-Push Transmission and Exchange-Rate Pass-Through: The positive and statistically significant relationship between tariff exposure and inflation provides clear evidence of a cost-push inflation mechanism. The coefficient ($\beta_1 = 0.27$) implies that an increase in tariff exposure directly raises domestic price levels through higher import costs and production bottlenecks. These results are consistent with the findings of Cavallo et al. (2021), who observed that U.S. tariffs during 2018–2019 were almost fully passed through to consumer prices, with little evidence of offsetting currency adjustments. In addition to direct price effects, the inflationary response reflects secondary channels: intermediate input inflation and reduced supply chain efficiency. As imported inputs become more expensive, firms raise prices of final goods to maintain margins. Exchange-rate movements further amplify this pass-through, as depreciation increases import costs in domestic currency terms. The positive and significant coefficients on both oil prices and exchange rates reinforce this cost-push narrative, showing that global and financial variables jointly contribute to inflationary pressures. From a policy perspective, the inflationary consequences of tariff measures contradict the conventional justification for protectionism as a

means of stabilizing domestic industries. Instead, the evidence suggests that tariffs create a trade-off between short-term protection and long-term price stability, an outcome that is particularly damaging in economies with limited monetary credibility or high import dependency.

d) Synthesis and Broader Economic Implications: Taken together, these results suggest that the Trump tariff war operated through three interrelated channels:

i. **Trade Channel:** Direct reduction in trade volumes due to increased import costs and retaliatory barriers.

ii. **Production Channel:** Decline in industrial output and investment owing to higher input prices and uncertainty.

iii. **Price Channel:** Transmission of higher costs into consumer prices, generating inflationary pressures globally.

The interaction of these channels underscores the complexity of global macroeconomic interdependence. Even countries not directly targeted by tariffs experienced secondary effects through exchange rates, commodity prices, and supply-chain disruptions. These findings resonate with the IMF (2020) and WTO (2021) assessments that the tariff war reduced global trade elasticity, weakened growth momentum, and contributed to inflationary persistence during the post-pandemic recovery.

e) Policy Interpretation: The empirical results carry important policy implications. First, protectionist measures while politically appealing in the short run tend to impose long-run efficiency losses and inflationary costs. Second, multilateral coordination remains crucial for minimizing spillover effects; unilateral trade actions have global repercussions beyond their intended targets. Finally, the findings emphasize the need for macroeconomic diversification and institutional resilience in developing economies, which remain disproportionately affected by external tariff shocks. In sum, the empirical evidence validates the theoretical expectation that tariffs, by disrupting trade and production, ultimately impose a global macroeconomic cost. The Trump tariff war thus serves as a natural experiment revealing the fragility of global value chains and the inflationary risks of protectionist policy.

5.4. Robustness Checks

To ensure that empirical results presented in earlier subsections are not excessively affected by considerations like model specification, composition of samples, or possible indigeneity concerns, an extensive and exhaustive set of robustness analyses were conducted. Such painstaking verifications aim to check for the stability of estimated coefficients under a variety of different model specifications, exclusion of some of the sub-samples, as well as different definitions of a variable. Consistency of both signs as well as magnitudes across a variety of different tests helps to strengthen considerably credibility, as well as the reliability, of the principal results that have been described. Additional dynamic panel estimates are presented in Table 10, confirming that tariff effects remain significant and persistent even after accounting for lagged responses.

a) Exclusion of Major Economies: A potential concern in global panel studies is that results may be disproportionately influenced by large economies such as the United States and China, which were both central to the 2018–2020 tariff conflict and represent significant shares of global trade. To assess this, the estimates were re-run excluding both countries from the sample. The results remained qualitatively unchanged. The coefficient on the Tariff Exposure Index (β_1) for trade volume remained negative at (−0.48) and statistically significant at the 1% level. For GDP growth, the estimated coefficient was −0.39, also significant at 5%. Inflation effects remained positive in (+0.25), albeit slightly attenuated. The results demonstrate that the global effects seen in this analysis stem not just from the two main actors in the trade war, but also from additional systemic links in global production and consumption.

b) Lagged Tariff Variables: In order to properly diminish as well as manage any existing or possible indigeneity problem together with the influence of lagged adjustments that might occur, we conducted a re-estimation of the model. In this renewed estimation, we precisely added the lagged Tariff Exposure Index, which we refer to as ($TAR_{i,t-1}$), as our main independent variable. This methodology was applied in a bid to comprehensively address as well as control for any feasible reverse causality that might be affecting economic performance. The estimates reveal distinctly that exposure to tariffs, if lagged, remains significant in all of the specifications of interest in the estimates, albeit with a caveat that the size of such effects is relatively lower than in earlier studies. In particular, the coefficient of trade saw a reduction, changing from a value of −0.52 to −0.46, and with a similar development, that of inflation changed from a value of 0.27 to 0.21. This implies that, while the impact of tariffs remains significant, their influence has since diminished over time with adjustments via diversification or substitution of a country as a supply origin of products in reaction to such tariffs. Additionally, this finding of temporary persistence provides strong support towards understanding the need to think about such effects of tariff

shocks by considering not only the effects in a period, but also medium-term macroeconomic effects that may occur as a consequence of such shocks.

c) Alternative Tariff Measures: To assess the sensitivity to the construction of the variables, the Tariff Exposure Index was replaced with two measures, a bilateral exposure index, which captures only the direct tariffs observed between the U.S. and China; and (ii) a global trade-weighted tariff rate from the WTO database, which considers total tariff incidence across economies. In both specifications, the coefficients preserved their signs and remained statistically significant. Using the bilateral index, the estimates were −0.49 for trade and +0.23 for inflation; using the global index, they were −0.44 and +0.26, respectively. The close agreement across measures indicates that the contractionary effects on trade (and growth) and the inflationary impact are inherent to protectionist shocks rather than artifacts of measurement choice.

d) Dynamic and Instrumental Variable (System GMM) Estimations: System GMM estimates for dynamic panels were employed to test the robustness of the results controlling for any indigeneity. In order to control for the effect of persistence, lagged dependent variables were employed and internal instruments were constructed using lagged regressor levels and differences. The Arellano–Bond AR (2) test showed evidence of no second-order serial correlation (p-value = 0.37), and the Hansen test of over-identifying restrictions confirmed instrument validity (p-value = 0.24). The direction and significance of the tariff exposure coefficients remained the same: trade and growth were negative while inflation was positive. This provides evidence that the relationship is not being driven by simultaneity bias or omitted variable issues. The diagnostic results in Table 12 confirm the validity of the econometric specification, with no second-order autocorrelation and acceptable instrument strength.

e) Subperiod Analysis: To examine time-series ruggedness, we divided the dataset into two separate subperiods: ((i) the active tariff phase during 2018–2020, as well as (ii) the post-pandemic period of adjustment during 2021–2022. We note that both contractionary and inflationary impacts were larger during the active phase of tariffs, which implies that disruptions caused by tariffs were maximum at a time when global trade tensions were high. On the contrary, during the pandemic period, magnitudes became smaller as per trade diversification as well as changes in policy.

f) Summary of Robustness Findings: The summary table, Table 9, tabulates the overall results of all robustness tests. All models preserve both the direction of bias as well as the statistical significance of the principal tariff coefficients, thus validating the soundness of the main empirical results.

Table 9. Summary of robustness results across alternative specifications

Specification	Trade Volume (β_1)	GDP Growth (β_1)	Inflation (β_1)
Baseline FE Model	−0.52***	−0.43***	+0.27***
Excl. US & China	−0.48***	−0.39**	+0.25**
Lagged Tariff ($TAR_{i,t-1}$)	−0.46***	−0.37**	+0.21**
Bilateral Tariff Index	−0.49***	−0.41**	+0.23**
Global Weighted Tariff Index	−0.44***	−0.38**	+0.26**
System GMM (Dynamic)	−0.51***	−0.40**	+0.28***

Notes: Asterisks denote statistical significance at 1% (***), 5% (**), and 10% (*) levels.

The broad trend demonstrated by all tests of robustness states that:

i. Tariff exposure consistently has a restrictive impact on trade and economic growth, while simultaneously exerting an inflationary influence on prices.

ii. These results are robust to the impact of accounting for big economies, the application of alternative measures of tariffs, and the correction of dynamic indigeneity.

iii. Long-run persistence of the estimated sign and magnitude of the respective specifications does guarantee strong internal validity and external generalizability of the findings.

Overall, the stability test confirms the major empirical result of the study, suggesting that the Trump Trade War exerted prominent and lasting contractionary effects on inter-foreign trade and economic growth and higher inflation among developed and developing countries.

6. Policy Implications

The research findings that are reported in this were able to show that the Trump tariff war has had statistically and economically meaningful contractionary effects on trade and output, as well as inflationary effects in both advanced and developing countries. These findings have significant policy implications at many levels for the United States as the instigator of the trade conflict, for the United States' key trading partners, and for the international and global framework of economic governance. This section discusses these implications in turn and provides lessons for trade and macroeconomic policy design for the future.

6.1. Implications for the United States

The results suggest that the United States only marginally improved its economy as a result of tariffs while undertaking significant domestic losses by raising prices for consumers and reducing U.S. manufacturing competitiveness. While tariffs are often justified by protecting U.S. manufacturing and resolving trade deficits, the analysis shows that by increasing input costs, tariffs eliminated any positive effects from import substitution. Manufacturers who depend on global supply chains (the automotive, electronics, and machinery industries) are suffering from profitability and production delays.

Moreover, the inflationary pass-through documented in Section 5.3 implies that consumers bore a substantial portion of the tariff burden through higher prices for imported goods and intermediate products. Studies such as Amiti et al. (2019) confirm that nearly the full incidence of U.S. tariffs is passed on to domestic consumers rather than foreign exporters. This contradicts the popular narrative that tariffs would primarily harm foreign competitors. From a macroeconomic perspective, the tariffs caused a temporary distortion in relative prices, lowered investment, and weakened longer-term productivity growth. The results imply that unilateral protectionism, even when driven by valid trade considerations, can diminish domestic welfare unless accompanied by broad-based industrial policy reforms that boost competitiveness via innovation and upgrading new technologies.

6.2. Implications for Trading Partners

The spillover effects in the analysis showed that trading partners of the U.S., especially export-driven economies, experienced two forms of stress from the trade disputes: retaliation through an escalation of tariffs and subsequent structural adjustment in the production networks. The retaliatory action by China, the European Union, and others exacerbated both the initial shock from the tariffs by decreasing bilateral trade volumes and created uncertainty in global markets. Emerging Economies embedded in U.S.-led global value chains were especially vulnerable to disruption, and economies that re-directed sourcing and production from their traditional value chains experienced significant disruption to their manufacturing clusters, and in East and Southeast Asian cases. Companies located in developing economies experienced liquidity restrictions, increased prices of imports, and weakened competitiveness of exports. Over the medium term, these factors facilitated the movement of production and supply chains to those areas that had more stable trading relationships-a transition that may be painful in the short run but may yield long-term benefits of diversification there are significant measures and negotiation of trade relationships are difficult and will require adjustment.

The empirical evidence also suggests that developing economies experienced more pronounced output losses than advanced economies. They indicate asymmetric capacity in absorbing external shocks. Countries with flexible exchange-rate regimes and strong fiscal buffers (*e.g.*, South Korea, Mexico) showed more flexibility in responding, whereas those with narrow export bases and high import reliance (*e.g.*, Vietnam, Indonesia) experienced sharper slowdowns. There are key lessons for economic policymakers and global institutions, from the research, we want to highlight in three areas related to trade diversification and macroeconomic resilience, protectionist impacts and responses, and the economic challenges posed by climate change.

6.3. Global Economic Policy Lessons

In an international context, the implications of this research suggest three main messages for economic policymakers and international organizations.

a) **The Imperative of Multilateral Coordination:** The trade war revealed the weaknesses of the multilateral trading system and the weaknesses of unilateral approaches to trade. The resulting global spillover also highlighted the importance of rule-based systems under the auspices of the World Trade Organization (WTO). The rules and processes established by the WTO need to be updated to address trade today in digital goods, intermediate services and environmental standards. For this reason, there is a need for coordinated reform of the WTO that would seek more efficient resolution of disputes other than tariffs as a means of managing trade tensions.

b) **Supply Chain Diversification and Resilience:** Another vital lesson is the need for greater diversification in supply chains. The concentration of most global production in a limited number of locales amplified the damage associated with the tariff conflict. Governments and businesses, in coordination with each other, must pursue diversification strategies through regional trade agreements, technology enabled methods such as digital trade facilitation, and a drive for intentional investment in logistics and connectivity infrastructure. Policy incentives for reshoring or near-shoring should be based on a cost-benefit analysis of resiliency versus efficiency.

c) Avoidance of Protectionist Escalation: In conclusion, the experience of the Trump tariff war indicates that protectionist measures often have unintended macroeconomic effects: inflation, reduced trade efficiency, and diminished global welfare. Future trade policy should focus on engagement by using industry-specific policies, reskilling labor, and innovation-based competition, not tariffs. Multilateral organizations serve as an important venue for upholding a dialogue that can prevent retaliatory actions and encourage more predictable global behavior.

7. Conclusion and Future Research

This research aims to understand the global macroeconomic effects of a Trump tariff war with an integrated analysis of trade, growth, and inflation for seventy economies from 2015-2022. A panel data framework was implemented that included fixed effects, random effects and dynamic estimations, resulting in systematic empirical evidence of tariff exposure's implications for trade dynamics and related macroeconomic performance. The findings also provide important lessons on the broader implications of protectionist policies in an increasingly interdependent world economy.

7.1. Summary of Findings

The empirical evidence identifies three key conclusions. Initially, tariff exposure had both statistical and economic significance, and it was, on average, negatively associated with international trade levels. Thus, damage to international supply chains and increased import prices led to observable declines in trade openness, even in economies not specifically facing U.S. tariffs. Second, the fall in trade flows concomitantly matched the slowdown in GDP growth, encapsulating the theoretical hypothesis that protectionist policies distort resource allocation and reduce production efficiency. Third, the study showed that tariffs fomented inflationary pressures through the avenue of cost-push mechanisms, as higher prices for imports and intermediate inputs radiated through domestic production structures.

The evidence indicates that President Trump's trade conflict produced three macroeconomic consequences on the economy created by tariffs: a reduction in trade, a deceleration of economic performance, and an increase in the rate of inflation. Even though the severity of the effects varied across countries, the overwhelming tendency remained the same in all models, underscoring the fundamental properties of the interconnected global economy. Furthermore, the evidence shows that the less developed and export-oriented countries of the world experienced a disproportionate share of the burden of adjustment due to the lack of monetary and fiscal policy room.

7.2. Policy Takeaways

The findings of this study have many key lessons for economic policy making. Above all, even though protectionist policies may yield short-term political benefits, the corresponding economic losses are likely to outweigh them on a longer time frame. Through the increase of input prices and the reduction of competition pressure, tariffs increasingly lower productivity, discourage investment, and hamper the quality of life of consumers. The hoped-for benefits of the generation of domestic manufacturing were largely offset by the increased burdens on firms and households that needed to cover higher production and living costs.

Moreover, in the current situation of an increasingly integrated world economy, individual trade actions rarely remain confined by national borders. Implications have effects beyond borders, creating disruptions in supply lines and altering price dynamics of different regions. These results highlight the continued importance of solidifying multilateral institutions, and particularly the World Trade Organization (WTO), to ensure trade remains transparent, predictable, and based on collective rules and not political confrontation. Just as severe are the inflationary effects induced by the disagreement on tariffs. This episode underscores the delicate interplay between trade policy and price stability. Policymakers should be aware that trade barriers are not the only fiscal instruments, but also supply shocks diffusing through economies and increasing costs, rendering them even more volatile.

Briefly, this paper underscores the broader reality: sustainable competitiveness cannot be forged behind sheltering walls of tariffs. Ultimately strong economics is built on structural transformation fueled by sustained investment in technology, innovation, and human capital. Long-term prosperity ultimately hinges, not upon isolation, but upon openness, flexibility, and productive integration into the world economy.

7.3. Limitations and Future Research

Although this paper provides strong cross-country evidence on the global impact of tariff shocks, it also leaves open several avenues of future investigation. To begin, empirical investigation has generically been conducted on a broad, macroeconomic scale. Future studies could push this paradigm towards sectoral or firm-specific ones, where the impact of tariffs would inevitably vary by industry. Industrial sectors such as manufacturing, technology, and agriculture, which are among the most affected by the Trump tariffs, would be an ideal backdrop for the investigation of how firms reacted through innovations of input substitution, supply chain restructuring, and employment trend shifts. Investigation of these adjustments at the firm-specific or industry level would bring some much-needed nuance to the broad-based macroeconomic results of this paper.

Another weakness applies to the breadth of the policy tools available to trade under investigation. This paper focuses almost exclusively on tariff exposure, though not by including non-tariff measures of export restraints, investment barriers, or sanctions, which have increasingly become prominent both during and after the tariff war. By considering these factors, future research would have a better and more accurate view of the current state of protectionism along with global implications.

Third area for future research concerns the years beyond 2022. United States trade policy under subsequent governments, and how it relates to pandemic recovery plans, supply-chain diversification efforts, and growing geopolitical rivalries, deserves close examination. Comparative studies of the Biden administrations adopted trade stance, and whether it represents a continuation or shift of policies of the Trump administration, could help to illuminate whether the trend toward protectionism has become a permanent facet of international trade approaches or gives way to a new kind of strategic economic diplomacy. Ultimately, future studies would be aided by the combination of macroeconomic modeling and network-based methods of global value chains. These are the approaches, the ones that would reveal the structural conduits through which tariff shocks propagate through various countries and industries. Comprehension of these mechanisms, be they broad or granular, would not only reveal systemic interconnections but would reveal where, within the increasingly volatile global economy, resilience might be made stronger.

Appendices

A. Construction of the Tariff Exposure Index

The Tariff Exposure Index (TAR) is a composite indicator designed to quantify each country's degree of exposure to tariff-related trade disruptions arising from the Trump administration's trade policies between 2018 and 2020. The index accounts for both direct exposure (tariffs imposed on a country's exports or imports by the United States) and indirect exposure (through intermediate goods and value-chain linkages).

A.1 Conceptual Framework

The index is based on the premise that tariff exposure varies not only with the magnitude of tariffs imposed but also with a country's integration into global value chains (GVCs). A nation highly dependent on intermediate exports to the U.S. or to U.S. trade partners indirectly affected by tariffs will experience greater exposure.

A.2 Data Sources

The following data sources were used in constructing the index:

- U.S. Trade Representative (USTR): List of tariff actions and product-level rates implemented between 2018 and 2020.
- World Trade Organization (WTO) Tariff Database: MFN (Most-Favored Nation) and applied tariff schedules by country and sector.
- World Integrated Trade Solution (WITS): Bilateral trade flows at the HS-6 level for 2015–2022.
- OECD TiVA Database: Global value chain participation indices used to capture indirect exposure through intermediate goods.

B. Diagnostic Test Results

This appendix reports diagnostic tests used to validate model assumptions and ensure the statistical reliability of the panel estimations.

B.1 Hausman Test for Model Selection

The Hausman test compares the Fixed Effects (FE) and Random Effects (RE) estimators. The null hypothesis of no systematic difference between coefficients is rejected for all dependent variables ($p < 0.01$), confirming the suitability of the FE model.

Table 11. Hausman test results

Dependent Variable	Test Statistic (χ^2)	p-Value
Trade Volume	22.48	0.0002
GDP Growth	17.32	0.0016
Inflation	15.27	0.0024

B.2 Serial Correlation and Heteroscedasticity Tests

To check for autocorrelation, the Wooldridge test for serial correlation was applied. The null hypothesis of no first-order autocorrelation was rejected ($p < 0.05$), indicating the presence of AR (1) serial correlation, which was corrected using clustered robust standard errors. The Modified Wald test confirmed the presence of group wise heteroscedasticity ($p < 0.01$), further justifying the use of robust variance estimators.

Table 12. Diagnostic tests for serial correlation and heteroscedasticity

Test	Statistic	p-Value
Wooldridge Serial Correlation Test	$F(1,69) = 8.43$	0.0049
Modified Wald Test (Heteroscedasticity)	$\chi^2(70) = 121.8$	0.0000
Breusch–Pagan LM Test (RE vs. OLS)	$\chi^2(1) = 11.54$	0.0007
Variance Inflation Factor (Mean VIF)	2.83	–

B.3 Instrument Validity in Dynamic Estimation

For the System GMM estimations, instrument validity was confirmed through the Hansen J-test and Arellano–Bond tests for autocorrelation. Both diagnostics supported the validity of instruments and absence of higher-order serial correlation, as shown in Table 10. Together, these diagnostics confirm that the model satisfies the necessary econometric assumptions, reinforcing the credibility of the estimated results.

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Data Availability

The data used in this study are obtained from publicly available sources, including the United States Trade Representative (USTR), World Trade Organization (WTO), World Integrated Trade Solution (WITS), International Monetary Fund (IMF) World Economic Outlook Database, World Bank World Development Indicators (WDI), UNCTAD, and OECD databases. All data are openly accessible through the respective institutional portals. Processed data and replication files are available from the author upon reasonable request.

Author Contribution

Janardan Behera solely conceptualized the study, developed the methodological framework, collected and processed all data, conducted empirical analysis and robustness checks, prepared all tables and figures, and solely wrote and revised the manuscript.

Declaration of Competing Interest

The author declares that there are no competing interests, financial or otherwise, associated with this research.

Ethical Approval

This study does not involve human participants, personal data, or experimental protocols requiring ethical clearance. Ethical approval was therefore not required.

Statement of Originality

This manuscript is an original work authored solely by Dr. Janardan Behera. It has not been published previously, is not under consideration elsewhere, and contains no plagiarized or AI-generated content. All analysis, writing, and interpretations are the author's own.

References

[1] Amiti, M., Redding, S. J., & Weinstein, D. E. (2019). The impact of the 2018 tariffs on prices and welfare. *Journal of Economic Perspectives, 33*(4), 187–210. https://doi.org/10.1257/jep.33.4.187

[2] Amiti, M., Redding, S. J., & Weinstein, D. E. (2020). Who's paying for the U.S. tariffs? A longer-term perspective. *AEA Papers and Proceedings, 110*, 541–546. https://doi.org/10.1257/pandp.20201087

[3] Baldwin, R. (2016). *The great convergence: Information technology and the new globalization*. Harvard University Press. https://doi.org/10.4159/9780674972680

[4] Brander, J. A., & Spencer, B. J. (1985). Export subsidies and international market share rivalry. *Journal of International Economics, 18*(1–2), 83–100. https://doi.org/10.1016/0022-1996(85)90006-6

[5] Cavallo, A., Gopinath, G., Neiman, B., & Tang, J. (2021). Tariff pass-through at the border and at the store: Evidence from U.S. trade policy. *American Economic Review: Insights, 3*(1), 19–34. https://doi.org/10.1257/aeri.20190364

[6] Corden, W. M. (1974). *Trade policy and economic welfare*. Clarendon Press.

[7] Fajgelbaum, P. D., Goldberg, P. K., Kennedy, P. J., & Khandelwal, A. K. (2020). The return to protectionism. *Quarterly Journal of Economics, 135*(1), 1–55. https://doi.org/10.1093/qje/qjz036

[8] Fujita, M., Krugman, P. R., & Venables, A. J. (1999). *The spatial economy: Cities, regions, and international trade*. MIT Press.

[9] Gereffi, G. (2018). *Global value chains and development: Redefining the contours of twenty-first century capitalism*. Cambridge University Press. https://doi.org/10.1017/9781316222492

[10] Grossman, G. M., & Helpman, E. (1995). Technology and trade. In G. M. Grossman & K. Rogoff (Eds.), *Handbook of international economics* (Vol. 3, pp. 1279–1337). Elsevier. https://doi.org/10.1016/S1573-4404(05)80010-2

[11] Handley, K., Kamal, F., & Monarch, R. (2022). Rising import tariffs, falling export growth: When modern supply chains meet old-style protectionism. *Journal of International Economics, 136*, Article 103594. https://doi.org/10.1016/j.jinteco.2021.103594

[12] Heckscher, E. (1919). The effect of foreign trade on the distribution of income. *Ekonomisk Tidskrift*, 497–512.

[13] International Monetary Fund. (2020). *World economic outlook: A long and difficult ascent*. IMF. https://www.imf.org/en/Publications/WEO

[14] Krugman, P. R. (1979). Increasing returns, monopolistic competition, and international trade. *Journal of International Economics, 9*(4), 469–479. https://doi.org/10.1016/0022-1996(79)90017-5

[15] Krugman, P. R. (1980). Scale economies, product differentiation, and the pattern of trade. *American Economic Review, 70*(5), 950–959. https://doi.org/10.7916/D8765QVK

[16] Krugman, P. R. (1991). Increasing returns and economic geography. *Journal of Political Economy, 99*(3), 483–499. https://doi.org/10.1086/261763

[17] List, F. (1841). *The national system of political economy*. J. G. Cotta.

[18] Obstfeld, M., & Rogoff, K. (1996). *Foundations of international macroeconomics*. MIT Press.

[19] Office of the United States Trade Representative. (2020). *2020 trade policy agenda and 2019 annual report*. USTR.

[20] Ohlin, B. (1933). *Interregional and international trade*. Harvard University Press.

[21] Ricardo, D. (1817). *On the principles of political economy and taxation*. John Murray.

[22] Smith, A. (1776). *An inquiry into the nature and causes of the wealth of nations*. W. Strahan & T. Cadell.

[23] Stolper, W. F., & Samuelson, P. A. (1941). Protection and real wages. *Review of Economic Studies, 9*(1), 58–73. https://doi.org/10.2307/2967638

[24] World Trade Organization. (2020a). *World trade report 2020*. WTO.

[25] World Trade Organization. (2020b). *World trade statistical review 2020*. WTO.