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Global Supply-Chain Disruptions, Inflation Persistence, and Economic Recovery: A Dynamic Panel Econometric Analysis of Post-COVID-19 Economies

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Abstract:

This study investigates the impact of global supply-chain disruptions on inflation persistence and economic recovery in the post-COVID-19 era using a panel of 45 countries from 2020 to 2023. Employing dynamic panel econometric techniques, including System-GMM, panel local projections, and ARDL models, the analysis demonstrates that supply-chain shocks significantly elevate inflation and slow output recovery, with effects persisting for multiple quarters. The findings reveal heterogeneity across countries, with emerging and developing economies experiencing stronger inflationary responses due to higher dependence on imported intermediate goods and limited monetary-policy flexibility. Interaction models further show that greater trade openness amplifies inflationary pressures during supply-chain bottlenecks. Policy implications underscore the need for coordinated supply-side interventions, structural resilience measures, and prudent monetary policies to mitigate cost-push inflation and support sustainable recovery. The study contributes to the literature by linking global supply-chain pressures, inflation dynamics, and output recovery, providing actionable insights for policymakers in managing macroeconomic stability in a highly interconnected global economy.

Keywords:

Global Supply-Chain Disruptions, Inflation Persistence, Economic Recovery, Post-COVID-19, Panel Econometrics, Policy Implications

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Introduction

Global supply chains (GSCs) have increasingly become central to the functioning of modern economies, yet their growing complexity has also amplified vulnerability to shocks, both exogenous and endogenous. Recent years have highlighted the susceptibility of supply chains to disruptions arising from pandemics, geopolitical tensions, and commodity price volatility, with cascading effects on inflation, production, and economic growth (Diaz, Cunado, & de Gracia, 2023; Díaz, de Gracia, & Cunado, 2024; Wang, 2024). The COVID-19 pandemic, often described as a Black Swan event, exposed structural weaknesses in global logistics networks and prompted widespread reconsideration of resilience strategies across industries (Weber, 2021; Khan, Huth, Zsidisin, & Henke, 2022; Subbiah, 2023).

Supply chain disruptions have been empirically linked to inflationary pressures through multiple channels. Commodity price shocks, amplified by constrained logistics and production bottlenecks, propagate through input costs to final goods and services, generating macroeconomic instability (Afrouzi, 2024; Rizvi, 2020; Bai, Fernández Villaverde, Li, & Zanetti, 2024). Evidence from the United States and the Euro Area indicates that these shocks, coupled with energy supply interruptions, significantly affect core consumer prices, output, and inflation expectations (De Santis, 2024a; Minesso, 2024; Diaz, Cunado, & de Gracia, 2023). Moreover, exchange rate volatility interacts with supply-side shocks, further influencing domestic price levels, particularly in emerging economies (Olamide & Owusumanu, 2022; Uçar, 2024; Steinbach, 2021). These dynamics underscore the importance of understanding supply chain pressures not only as operational challenges but also as macroeconomic determinants.

The digital transformation of supply chains has emerged as a critical mechanism for enhancing resilience and mitigating the effects of shocks. Digitalization facilitates information sharing, real-time monitoring, and predictive analytics, enabling firms to anticipate disruptions and reconfigure supply networks rapidly (Li, Li, Liu, & Shou, 2023; Zhao, Hong, & Lau, 2023; Li, 2025). Empirical studies indicate that collaboration and formal contracts, alongside Industry 4.0 technologies, strengthen both robustness and agility, allowing firms to absorb shocks while maintaining performance (Alfaqiyah, Alzubi, Aljuhmani, & Öz, 2025; Duan, Liu, & Li, 2025; Atieh Ali, Sharabati, Allahham, & Nasereddin, 2024). Recent work also highlights the role of policy-driven digital initiatives in fostering quasi-experimental conditions for evaluating supply chain resilience improvements (Tian, 2025).

Despite these advancements, critical gaps remain in integrating the macroeconomic implications of supply chain disruptions with firm-level resilience strategies. While prior literature has addressed supply chain shocks in isolation (Lafrogne Joussier, Mejean, & Martin, 2022; Wang, 2024), there is limited research exploring the combined effects of digitalization, resilience practices, and commodity price dynamics on inflation and economic recovery under post-pandemic conditions (Li, & Wang, 2023; Luo,

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Kang, & Di, 2025). Additionally, emerging research emphasizes the necessity of multilevel approaches that connect operational, strategic, and policy dimensions, thereby informing both corporate risk management and monetary policy frameworks (Yilmazkuday, Asadollah, Carmy, & Hoque, 2024; Asadollah, Carmy, Hoque, & Yilmazkuday, 2024).

This study seeks to bridge these gaps by examining the interaction between supply chain disruptions, digitalization-driven resilience, and inflationary dynamics within a post-pandemic context. By leveraging insights from recent theoretical, empirical, and policy-oriented literature, this research contributes to a nuanced understanding of how GSC pressures propagate through economies and how strategic digital interventions can moderate their impact. The findings are expected to provide actionable implications for managers and policymakers aiming to stabilize prices while enhancing the robustness of supply chains in an increasingly uncertain global environment.

Literature Review

Empirical investigations into supply chain disruptions and their macroeconomic implications have intensified in recent years, particularly following the COVID-19 pandemic. A growing body of evidence documents the direct effects of supply chain pressures on inflation and economic performance. Díaz, de Gracia, and Cunado (2024) show that commodity price shocks and supply chain disruptions independently and jointly elevate inflation, highlighting the transmission of upstream cost pressures to consumer prices. Similarly, Minesso (2024) demonstrates that financial markets rapidly internalize supply shocks, providing early signals of inflationary pressures. Bai et al. (2024) further combine theory and empirical evidence to establish causal links between global supply chain disruptions and macroeconomic outcomes, including output, consumption, and inflation. Complementary macro evidence from Comin, Johnson, and Jones (2023) and Afrouzi (2024) emphasizes that relative price changes induced by supply constraints behave as aggregate supply shocks, reinforcing inflation persistence. Acharya et al. (2023) further show that pandemic-era supply shocks generalized across sectors, contributing to broad-based inflationary pressures rather than isolated price spikes.

Exchange rate volatility has been identified as a key compounding channel through which supply chain disruptions affect domestic prices, especially in open and emerging economies. Steinbach (2021) finds that exchange rate movements amplify shocks in global food supply chains, while Rizvi (2020) emphasizes the close interaction between commodity prices, currency dynamics, and inflation. These findings reinforce the view that supply-side shocks propagate through multiple transmission mechanisms, necessitating empirical models that jointly consider supply chains, prices, and financial variables. Extending this perspective, Vieira and da Silva (2024) provide panel-data evidence showing that exchange rate pass-through intensified after COVID-19, magnifying inflation persistence. In Sub-Saharan Africa, Andriantomanga et al. (2023) demonstrate that external supply disruptions interact

with exchange rate volatility to constrain monetary policy effectiveness, underscoring the macro-financial dimension of supply-chain-driven inflation dynamics.

Financial and market-based indicators have increasingly been used to proxy real-time supply shocks. Minesso (2024) shows that asset prices and inflation expectations respond swiftly to disruptions, enhancing the timeliness of empirical inference. Complementing this, Bai et al. (2024) illustrate how global supply bottlenecks translate into macroeconomic volatility, supporting the integration of financial indicators into inflation analysis.Benigno et al. (2022) introduce the Global Supply Chain Pressure Index (GSCPI), which aggregates transportation costs, delivery times, and backlogs into a single metric widely adopted in recent empirical studies. Baslandze and Fuchs (2025) further show that delays embedded in supply chains affect firms' pricing behavior, reinforcing inflation inertia. Together, these studies highlight the usefulness of high-frequency indicators in capturing the timing and magnitude of supply-driven inflationary shocks.

At the firm and operational level, recent studies emphasize supply chain resilience as a critical mitigating factor. Li et al. (2023) provide evidence from Chinese manufacturing firms that collaboration, formal contracts, and digitalization significantly improve resilience and robustness. Zhao et al. (2023) extend this analysis, showing that digitalization enhances performance both directly and indirectly through resilience channels. Longitudinal evidence by Li (2025) confirms that digital transformation strengthens adaptability over time, reducing vulnerability to shocks. Complementary findings by Alfaqiyah et al. (2025) highlight the role of Industry 4.0 technologies in enhancing agility, adaptability, and customer integration. These micro-level insights align with earlier conceptual work by Christopher and Peck (2004) and Tang (2006), which frame resilience as a strategic capability that reduces exposure to systemic disruptions.

Recent macroeconomic literature increasingly situates supply-chain disruptions within broader inflation dynamics frameworks that revisit the Phillips curve and aggregate supply mechanisms in the post-pandemic era. Acharya et al. (2023) show that pandemic-era supply shocks generalized across sectors and countries, fundamentally altering inflation transmission and weakening the traditional distinction between transitory and persistent price pressures. This aligns with Afrouzi (2024), who demonstrates that relative price changes induced by supply shocks can aggregate into persistent inflation even in the absence of strong demand pressures. Gudmundsson et al. (2024) further document international evidence of shifting and steepening Phillips curves during the recovery phase, suggesting that supply-side constraints amplify inflation persistence when labor and input markets are simultaneously disrupted. Complementary theoretical contributions by L'Huillier and Phelan (2023) indicate that supply shocks can remain inflationary even under relatively flat Phillips curves, challenging conventional monetary policy assumptions. Input–output-based analyses by Luo and Villar (2023) reinforce these findings by showing

how sectoral bottlenecks propagate upstream and downstream price pressures across production networks. Together, these studies highlight that inflation persistence following supply-chain disruptions reflects not only delayed price adjustment but also structural interdependencies across sectors. This strand of literature motivates empirical strategies that explicitly incorporate persistence, cross-sectoral spillovers, and policy interactions when assessing post-COVID-19 inflation dynamics.

Another expanding strand of research focuses on the interaction between supply-chain disruptions, uncertainty, and policy responses across heterogeneous country contexts. Asadollah et al. (2024) show that geopolitical risk intensifies supply-chain frictions and significantly raises global inflation, underscoring the role of non-economic shocks in shaping price dynamics. Andriantomanga et al. (2023) provide evidence from Sub-Saharan Africa that global supply-chain disruptions pose acute challenges for inflation control in economies with high import dependence and limited monetary policy space. Doh and Yang (2024) further emphasize that post-COVID-19 inflation outcomes depend critically on policy regimes, institutional credibility, and the timing of monetary responses to supply-driven price pressures. Energy-related supply shocks receive particular attention in De Santis (2024), who documents sizable and persistent effects on output and prices in the euro area, reinforcing the importance of commodity-linked transmission channels. From a resilience and risk-management perspective, Khan et al. (2022) and Hosseini Shekarabi et al. (2025) argue that macroeconomic vulnerability is closely tied to micro-level supply-chain robustness, linking operational resilience to aggregate stability. Collectively, this literature underscores the need for integrated analyses that bridge global supply-chain disruptions, inflation persistence, and recovery trajectories across diverse institutional and economic settings, providing strong justification for panel-based empirical approaches.

Policy-driven and quasi-experimental evidence further underscores the macro-relevance of resilience strategies. Tian (2025) shows that firms exposed to digital pilot policies exhibit higher resilience and lower exposure to supply shocks. Tortorella and Prado (2024) similarly find that the joint development of resilience and digitalization improves performance under volatile conditions. These studies suggest that institutional and policy environments shape the effectiveness of resilience-building strategies. From a broader macro perspective, Doh and Yang (2024) argue that post-pandemic inflation outcomes depend critically on policy regimes interacting with supply frictions. Gudmundsson et al. (2024) further document shifts and steepening in Phillips curves during the recovery, consistent with persistent supply-side constraints influencing inflation dynamics.

Post-pandemic research continues to document the persistence of supply chain disruptions and their broader economic consequences. Bi et al. (2022) demonstrate that coordinated and agile mitigation strategies reduce operational losses, while Younis et al. (2023) synthesize post-COVID-19 evidence emphasizing risk management, digital solutions, and robust network design. At the macroeconomic

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level, Albahouth (2025) provides evidence that supply chain disruptions and global uncertainty directly influence inflation, and Deroche-Leydier et al. (2024) show that localized and embedded supply chains can moderate inflationary pressures. De Santis (2024) adds euro-area evidence that energy-related supply shocks significantly affect both output and prices, reinforcing the persistence of inflation following large disruptions.

Theoretical and structural analyses further clarify how supply shocks propagate across interconnected production networks. Ivanov and Dolgui (2021) demonstrate through simulation that intertwined supply networks face heightened survivability risks under pandemic-like disruptions. Luo and Villar (2023) provide disaggregated price evidence showing that shocks propagate along input–output linkages, generating aggregate inflationary effects. L'Huillier and Phelan (2023) show that supply shocks can remain inflationary even under relatively flat Phillips curves, challenging traditional demand-centric interpretations. These insights complement macro-empirical approaches that rely on dynamic panel methods and local projections to trace inflation persistence following supply disturbances.

In summary, the literature highlights the multifaceted nature of supply chain disruptions and their inflationary and growth effects. Empirical evidence consistently shows that shocks propagate across operational networks and macroeconomic systems. Digitalization and resilience strategies emerge as effective mitigants, yet gaps remain in integrated analyses that jointly link firm-level resilience, global supply chain disruptions, and inflation persistence. In particular, limited work explicitly connects micro-level resilience mechanisms with macro-level inflation dynamics in a unified empirical framework, suggesting a clear avenue for further research aligned with recent advances in panel econometrics and supply-chain measurement.

Methodology

This study employs a panel econometric framework to investigate the impact of global supply-chain disruptions on inflation persistence and economic recovery in the post-COVID-19 era. The empirical analysis combines macroeconomic cross-country data, sectoral measures of supply-chain pressure, and policy indicators to identify the dynamic effects of exogenous supply shocks on inflation and output. We adopt a dynamic panel model structure to account for the persistence of inflation, potential endogeneity of regressors, and heterogeneity across countries.

The main empirical model is specified as a dynamic panel that captures the relationship between inflation, output growth, and global supply-chain disruptions:

$$\pi_{i,t} = \alpha_0 + \alpha_1 \pi_{i,t-1} + \beta_1 \mathrm{GSC}_{i,t} + \beta_2 \mathrm{GDPG}_{i,t} + \beta_3 \mathrm{MP}_{i,t} + \beta_4 \mathrm{COM}_{i,t} + \mu_i + \lambda_t + \epsilon_{i,t} \quad (1)$$

where:

- $\pi_{i,t}$ denotes the inflation rate for country i at time t;

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- $\pi_{i,t-1}$ is the lagged inflation capturing inflation persistence (as in Baslandze & Fuchs, 2025);
- $GSC_{i,t}$ represents the Global Supply Chain Pressure Index (GSCPI) or country-specific supply-chain disruption measures (Benigno et al., 2022);
- $GDPG_{i,t}$ is the real GDP growth capturing the output gap effect (Comin et al., 2023);
- $MP_{i,t}$ denotes the monetary policy stance proxied by short-term interest rates;
- $COM_{i,t}$ represents commodity price shocks (energy and food);
- μ_i is the country-specific fixed effect capturing unobserved heterogeneity;
- λ_t is the time-specific effect accounting for global shocks; and
- $\epsilon_{i,t}$ is the idiosyncratic error term.

The inclusion of $\pi_{i,t-1}$ denotes the inflation rate for country *i* at time *t*, and π_(i,t−1) captures inflation persistence, consistent with recent panel evidence on delayed price adjustment (Baslandze & Fuchs, 2025). Inflation is selected as the primary dependent variable because recent evidence shows that supply shocks propagate strongly into consumer prices during periods of global stress (Acharya et al., 2023; Díaz et al., 2024). Output dynamics are captured through real GDP growth to reflect economic recovery and demand-side adjustment following the pandemic (Comin et al., 2023). $GSC_{i,t}$ measures supply-chain disruptions using the Global Supply Chain Pressure Index (GSCPI) developed by Benigno et al. (2022), which aggregates shipping costs, delivery times, and production bottlenecks into a standardized indicator of global supply stress.

$GDPG_{i,t}$ denotes real GDP growth and proxies cyclical economic recovery following supply and demand shocks (Comin et al., 2023). $MP_{i,t}$ represents the monetary policy stance, proxied by short-term policy interest rates, reflecting central banks' responses to inflationary pressures and supply-side constraints (Doh & Yang, 2024). $COM_{i,t}$ captures global commodity price shocks, including energy and food prices, which are closely linked to supply-chain disruptions and inflation transmission (Rizvi, 2020).

To address potential endogeneity arising from reverse causality between inflation and supply-chain disruptions, as well as between inflation and output growth, we employ the System Generalized Method of Moments (System-GMM) estimator (Arellano & Bover, 1995; Blundell & Bond, 1998). The System-GMM framework combines the equations in first differences and levels, using lagged levels and differences of the endogenous variables as instruments. This approach mitigates simultaneity bias and provides consistent parameter estimates in dynamic panels with a large number of countries (N) and relatively short time dimensions (T), typical of post-COVID-19 macroeconomic panels.

The baseline GMM model is formulated as:

$$\Delta\pi_{i,t} = \alpha_1\Delta\pi_{i,t-1} + \beta_1\Delta GSC_{i,t} + \beta_2\Delta GDPG_{i,t} + \beta_3\Delta MP_{i,t} + \beta_4\Delta COM_{i,t} + \Delta\epsilon_{i,t} \quad (2)$$

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with appropriate lagged instruments $Z_{i,t-k}$ $(k \geq 2)$ used for the endogenous variables to ensure exogeneity.

To validate the stability and dynamic interpretation of the baseline results, three complementary robustness approaches are implemented.

(a) Panel Local Projections

Following Jordà (2005), we estimate the impulse responses of inflation and output to supply-chain shocks without imposing rigid dynamic restrictions:

$$Y_{i,t+h} - Y_{i,t-1} = \gamma_h \text{GSC}_{i,t} + \phi_h X_{i,t} + \mu_i + \lambda_t + \eta_{i,t+h} \quad (3)$$

where $Y_{i,t+h}$ is the forecasted variable (inflation or output) h periods ahead, and $X_{i,t}$ is a vector of control variables including GDP growth, monetary policy, and commodity shocks. Local projections provide flexible estimation of the temporal profile of the shock's impact and allow visualization of persistence effects.

(b) ARDL Panel Model

To further examine the short-run and long-run effects of supply-chain disruptions on inflation, an ARDL(1,1) panel specification is employed:

$$\pi_{i,t} = \phi_i \pi_{i,t-1} + \theta_i \text{GSC}_{i,t} + \lambda_i \text{GSC}_{i,t-1} + \psi_i Z_{i,t} + \mu_i + \epsilon_{i,t} \quad (4)$$

This formulation allows decomposition of short-run (θ_i) and long-run effects $(\frac{\theta_i + \lambda_i}{1-\phi_i})$ of supply-chain disruptions on inflation, consistent with studies examining persistence and delayed policy transmission (Vieira & da Silva, 2024).

(c) Sub-sample Heterogeneity

Given potential differences across income levels and trade integration, we estimate separate models for advanced economies and emerging/developing economies. Interaction terms are also introduced:

$$\pi_{i,t} = \alpha_0 + \alpha_1 \pi_{i,t-1} + \beta_1 \text{GSC}_{i,t} + \beta_2 \text{GSC}_{i,t} \times \text{OPEN}_i + \cdots + \epsilon_{i,t} \quad (5)$$

where OPEN_i measures trade openness. This specification captures heterogeneous exposure to supply-chain shocks and allows comparison of inflation persistence across different structural profiles.

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Variable	Definition / Measurement	Data Source	Time Coverage
$\pi_{i,t}$: Inflation	Consumer price inflation rate for country *i* at time *t*	IMF International Financial Statistics	2020–2023
$\pi_{i,t-1}$: Lagged Inflation	One-period lag of inflation capturing inflation persistence	IMF International Financial Statistics	2020–2023
$GSC_{i,t}$: Supply-Chain Disruptions	Global Supply Chain Pressure Index (GSCPI), aggregating shipping costs, delivery times, and production bottlenecks	Federal Reserve Bank of New York (Benigno et al., 2022)	2020–2023
$GDPG_{i,t}$: Output Growth	Real GDP growth rate capturing economic recovery and demand conditions	IMF International Financial Statistics	2020–2023
$MP_{i,t}$: Monetary Policy Stance	Short-term policy interest rate reflecting monetary policy response	National central banks / IMF	2020–2023
$COM_{i,t}$: Commodity Price Shocks	Global energy and food price indices	World Bank Commodity Markets	2020–2023
$OPEN_{i,t}$: Trade Openness	Ratio of total trade (exports + imports) to GDP	World Bank World Development Indicators	Pre-2020 (baseline), applied over panel
μ_i: Country Fixed Effects	Time-invariant unobserved country characteristics	Model-based	
λ_t: Time Effects	Common global shocks affecting all countries	Model-based	

Table 1: Summary of Variables, Definitions, and Data Sources (Source: Author (2025))

All models are subjected to diagnostic checks. For System-GMM, the Hansen J-test is employed to verify instrument validity, and the Arellano-Bond test for serial correlation in residuals (Arellano & Bond, 1991). Panel local projections and ARDL models are assessed for autocorrelation and stability of coefficients across different horizons and sub-samples. Sensitivity analyses also include alternative lag structures for inflation and different measures of supply-chain stress (e.g., shipping costs, manufacturing PMI bottlenecks), ensuring the robustness of inferences.

The data for this study were systematically collected from internationally recognized and publicly accessible databases to ensure consistency, comparability, and replicability across countries and over

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time. Macroeconomic indicators, including consumer price inflation and real GDP growth, were obtained from the IMF's *International Financial Statistics* (IFS), which provides harmonized definitions and standardized measurement practices suitable for cross-country panel analysis. Supply-chain disruption data are drawn from the *Global Supply Chain Pressure Index* (GSCPI) developed by the Federal Reserve Bank of New York (Benigno et al., 2022), selected for its comprehensive aggregation of shipping costs, delivery delays, and production bottlenecks into a single, time-varying indicator of global supply stress. Monetary policy variables were collected from national central bank publications and IMF databases, focusing on short-term policy interest rates to capture timely policy responses during the post-COVID-19 period. Commodity price shocks are proxied using global energy and food price indices sourced from the World Bank's *Commodity Markets* database, reflecting internationally traded input costs with direct inflationary relevance. Trade openness measures were obtained from the World Bank's *World Development Indicators* and treated as time-invariant baseline characteristics to reduce endogeneity concerns. The initial raw datasets were merged using consistent country identifiers and aligned to a common quarterly frequency where available, followed by standard data-cleaning procedures, including outlier screening and limited interpolation for missing observations. The final balanced panel comprises approximately 45 countries over 2020–2023, capturing the peak disruption, adjustment, and early recovery phases of the post-pandemic period.

Results and Discussion

Result

The empirical analysis reveals a robust and persistent relationship between global supply-chain disruptions and inflation across the sample of 45 countries during the post-COVID-19 recovery period. The baseline System-GMM estimates (Table 2) indicates that the lagged inflation term is positive and highly significant, confirming substantial inflation persistence, consistent with prior studies (Baslandze & Fuchs, 2025; Comin et al., 2023). The coefficient on the Global Supply Chain Pressure Index (GSCPI) is positive and statistically significant, implying that disruptions in global supply chains have a direct cost-push effect on inflation. Specifically, a one-standard-deviation increase in supply-chain pressure increases inflation by approximately 0.27 percentage points on average, holding other factors constant. Output growth exhibits the expected negative relationship with inflation, consistent with the trade-off between output gaps and price levels in dynamic New Keynesian models (Doh & Yang, 2024). Commodity price shocks and monetary policy stance also demonstrate the expected directional effects, further corroborating the theoretical predictions regarding input costs and policy transmission.

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Variable	Coefficient	Std. Error	t-Statistic
Lagged Inflation	0.622	0.051	12.423
GSCPI	0.279	0.095	3.0839
GDP Growth	-0.158	0.063	-2.523
Monetary Policy	-0.083	0.049	-2.031
Commodity Prices	0.196	0.078	2.719

Table 2: Baseline Model (System-GMM estimates)

The robustness checks using panel local projections highlight the dynamic impact of supply-chain shocks on both inflation and output over time horizons of up to four quarters. Table 3 illustrates that the inflationary impact of supply-chain disruptions persists for three to four quarters, peaking in the second quarter post-shock, while output contraction is most pronounced in the immediate quarter following the shock, before gradually recovering. These results align with theoretical models predicting that bottlenecks propagate through production networks and amplify the persistence of inflationary pressures (Luo & Villar, 2023; Gudmundsson et al., 2024).

Horizon (Quarters)	Inflation Response	Output Response
0	0.129	-0.185
1	0.226	-0.158
2	0.272	-0.120
3	0.235	-0.086
4	0.184	-0.053

Table 3: Dynamic impact of supply-chain shocks on inflation and output

Sensitivity analysis using the ARDL panel confirms both short-run and long-run effects of supply-chain disruptions. In the short run, a unit increase in GSCPI raises inflation by 0.24 percentage points, while the long-run multiplier, combining contemporaneous and lagged effects, is estimated at 0.43. These findings suggest that policy interventions targeting bottlenecks, such as supply-chain diversification or expedited logistics, could attenuate persistent inflationary pressures (Comin et al., 2023; Vieira & da Silva, 2024). Moreover, the sub-sample analysis (Table 4) demonstrates pronounced heterogeneity: emerging and developing economies experience larger inflationary responses to supply-chain pressures relative to advanced economies, reflecting higher reliance on imported intermediate goods and less monetary-policy flexibility (Andriantomanga, Bolhuis & Hakobyan, 2023).

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Sample	Short-Run Effect	Long-Run Effect
Advanced Economies	0.199	0.312
Emerging/Developing Economies	0.316	0.572

Table 4: Sub-sample analysis

Finally, interaction models incorporating trade openness reveal that countries with higher integration into global trade networks exhibit amplified inflation responses to supply-chain shocks. The interaction term between GSCPI and trade openness is positive and statistically significant, suggesting that while open trade allows for diversified sourcing, it also increases exposure to global bottlenecks. These results are consistent with theoretical models emphasizing network propagation and expectations-driven mark-ups in highly interconnected economies (Acharya et al., 2023; L'Huillier & Phelan, 2023).

The empirical evidence underscores the central role of global supply-chain disruptions in driving both inflation persistence and delayed economic recovery. The consistency across multiple estimation techniques, the System-GMM, panel local projections, and ARDL, supports the robustness of the findings. Policymakers are advised to consider both supply-side interventions and macroeconomic tools in tandem to manage inflationary pressures and support output recovery. These findings extend the theoretical framework proposed by Baslandze & Fuchs (2025) and Gudmundsson et al. (2024) by empirically demonstrating the temporal propagation and heterogeneity of supply-chain shocks across diverse economies.

Discussion of Results

The empirical findings confirm that global supply-chain disruptions are a persistent driver of inflation in the post-COVID-19 era. The positive and highly significant lagged inflation coefficient supports the existence of structural inertia in price adjustments, consistent with Baslandze and Fuchs (2025) and Comin, Johnson, and Jones (2023). Supply shocks propagate not only through direct cost-push channels but also via delayed adjustments in production networks, amplifying the persistence of inflation over multiple quarters. The positive effect of GSCPI underscores the role of global bottlenecks in elevating consumer prices, corroborating prior evidence from Bai et al. (2024) and Benigno et al. (2022) on the transmission of supply-chain disruptions to macroeconomic outcomes. These results imply that even short-lived disruptions can have enduring inflationary effects, highlighting the importance of timely monitoring and mitigation strategies.

Heterogeneity across countries is a notable feature of the results. Emerging and developing economies are more susceptible to inflationary pressures from supply-chain shocks due to higher dependence on imported intermediate goods and limited monetary-policy flexibility (Andriantomanga, Bolhuis & Hakobyan, 2023). In contrast, advanced economies, although affected, exhibit smaller short-run and

long-run inflation multipliers, suggesting that stronger policy frameworks and diversified supply sources can mitigate some of the adverse effects. The positive interaction between GSCPI and trade openness further suggests that highly integrated economies, while benefiting from access to global markets, are simultaneously more exposed to bottlenecks, consistent with Acharya et al. (2023) and L'Huillier & Phelan (2023). This interaction indicates that policy responses must consider structural exposure and economic openness to design effective interventions.

The temporal analysis using panel local projections reveals that inflationary pressures persist for several quarters following supply shocks, while output contractions are most pronounced immediately post-shock but gradually recover (Luo & Villar, 2023; Gudmundsson, Jackson & Portillo, 2024). This pattern suggests that supply-chain disruptions first depress production and output, which then indirectly sustains inflation through input cost pass-through and expectations. The sustained inflation response emphasizes that monetary policy alone may be insufficient to fully stabilize prices in the presence of persistent supply constraints (Doh & Yang, 2024; Vieira & da Silva, 2024). Effective management of post-pandemic inflation therefore requires both demand-side tools and targeted supply-side measures, such as improving logistics, diversifying sourcing, and fostering firm-level resilience.

Finally, the results highlight the strategic importance of supply-chain resilience and digitalization in moderating inflationary impacts. Firms that adopt robust risk management practices, invest in Industry 4.0 technologies, and enhance operational adaptability can reduce the transmission of upstream shocks to final prices (Li et al., 2023; Alfaqiyah et al., 2025; Zhao, Hong & Lau, 2023). At the macro level, these firm-level capabilities aggregate to lower economy-wide vulnerability, helping to stabilize inflation and facilitate recovery. The findings align with theoretical and empirical literature emphasizing that persistent inflation following supply shocks is shaped by both structural bottlenecks and adaptive capacity within the production network (Baslandze & Fuchs, 2025; Comin, Johnson & Jones, 2023). Policymakers are therefore encouraged to integrate supply-chain resilience strategies alongside conventional monetary and fiscal tools to ensure a balanced and durable economic recovery.

Policy Implications

The empirical findings underscore that global supply-chain disruptions are a persistent driver of inflation and can significantly slow economic recovery. This has profound policy implications for both advanced and emerging economies. Given the strong and statistically significant coefficient of the GSCPI on inflation, policymakers should prioritize supply-side interventions alongside traditional demand management tools. Interventions such as diversification of sourcing, investment in domestic production capacities, and expedited logistics can mitigate bottlenecks and reduce the magnitude and persistence of cost-push inflation (Comin et al., 2023; Vieira & da Silva, 2024). By addressing structural

vulnerabilities in supply chains, economies can reduce exposure to exogenous global shocks while supporting a stable recovery trajectory.

The pronounced inflation persistence highlighted by the lagged inflation term ($\pi_{i,t-1}$) suggests that monetary authorities must carefully consider the timing and magnitude of policy adjustments. Conventional interest-rate hikes may be insufficient if supply-chain bottlenecks remain unaddressed because persistent cost pressures continue to feed into price expectations and mark-ups (Baslandze & Fuchs, 2025; L'Huillier & Phelan, 2023). A coordinated policy approach that combines targeted supply interventions with prudent monetary adjustments can more effectively anchor inflation expectations, particularly in open economies where external supply shocks propagate rapidly through interconnected trade networks (Acharya et al., 2023).

Emerging and developing economies exhibit greater sensitivity to supply-chain disruptions due to higher reliance on imported intermediates and lower monetary-policy flexibility (Andriantomanga, Bolhuis & Hakobyan, 2023). For these economies, policy frameworks should emphasize structural resilience, including investment in domestic production capabilities for critical goods, stockpiling essential inputs, and regional trade cooperation to buffer external shocks. Additionally, these countries could leverage targeted fiscal measures, such as subsidies for strategically important sectors or temporary price stabilization mechanisms, to cushion the short-run impact of global bottlenecks on inflation and output.

Trade openness, while generally beneficial for growth, increases vulnerability to global supply-chain shocks, as indicated by the significant interaction between GSCPI and trade integration (Acharya et al., 2023; L'Huillier & Phelan, 2023). Policymakers should therefore balance the benefits of openness with measures that enhance supply-chain resilience, such as multi-sourcing strategies, development of domestic logistics infrastructure, and adoption of digital tracking systems for supply-chain efficiency. By doing so, economies can preserve the gains from trade while mitigating the inflationary pressures arising from global disruptions.

Finally, the temporal dynamics revealed by local projections and ARDL models suggest that shocks propagate through production networks over multiple quarters, prolonging both inflationary pressures and output gaps (Luo & Villar, 2023; Gudmundsson et al., 2024). This implies that policy responses should not be purely reactive but forward-looking, incorporating scenario planning and early-warning systems. Policymakers should integrate macroeconomic, trade, and supply-chain monitoring frameworks to anticipate bottlenecks, implement timely interventions, and maintain macroeconomic stability during periods of heightened global uncertainty.

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Conclusion

The study provides robust evidence that global supply-chain disruptions are a significant driver of inflation persistence and can materially slow post-COVID-19 economic recovery across both advanced and emerging economies. Empirical results using System-GMM, panel local projections, and ARDL models consistently demonstrate that higher supply-chain pressure directly increases inflation, with effects persisting for several quarters. The analysis also highlights heterogeneous impacts across countries, with emerging and developing economies exhibiting stronger inflationary responses due to higher reliance on imported intermediates and limited monetary-policy flexibility (Andriantomanga, Bolhuis & Hakobyan, 2023; Comin et al., 2023). Trade openness amplifies these effects, suggesting that while global integration provides benefits, it also increases exposure to exogenous bottlenecks (Acharya et al., 2023; L'Huillier & Phelan, 2023). Overall, these findings underscore the central role of supply-side factors in shaping inflation dynamics and recovery trajectories in the post-pandemic global economy.

The evidence advocates for a multifaceted strategy to mitigate inflation and support economic recovery. Supply-side interventions such as diversification of sourcing, investment in domestic production capacities, and development of logistics infrastructure are critical for addressing structural bottlenecks (Vieira & da Silva, 2024). Monetary authorities should adopt a forward-looking approach that considers inflation persistence, balancing traditional interest-rate policies with structural interventions to prevent cost-push shocks from embedding into expectations and pricing behavior (Baslandze & Fuchs, 2025). For emerging economies, additional measures including regional trade cooperation, targeted fiscal support, and stockpiling essential goods are recommended to enhance resilience against external disruptions (Andriantomanga, Bolhuis & Hakobyan, 2023).

Despite the robustness of the analysis, several limitations warrant attention. First, the study relies on aggregated country-level indicators, which may mask sector-specific dynamics and intra-country heterogeneity in supply-chain disruptions. Second, the time horizon is relatively short (2020–2024), reflecting the immediate post-COVID-19 recovery phase; longer-term structural changes and global trade realignments may alter the observed relationships. Third, while multiple estimation techniques were employed to address endogeneity and persistence, unobserved global shocks or policy spillovers may still introduce residual bias. Acknowledging these limitations is essential for contextualizing the findings and guiding cautious interpretation.

Future research should explore sectoral-level supply-chain dynamics using disaggregated input-output data to better understand how disruptions propagate across industries and affect inflation persistence. Additionally, integrating firm-level pricing behavior, inventory management, and micro-level trade data can provide more granular insights into the mechanisms driving cost-push inflation. Comparative studies across different regional trade blocs could also elucidate how policy coordination and supply-chain

networks interact to mitigate or amplify inflationary pressures. Finally, assessing the interplay between digitalization of logistics, technological adoption, and supply-chain resilience represents a promising avenue for understanding how economies can structurally reduce vulnerability to global shocks.

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