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Article

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Latin American Journal of Central Banking (LAJCB)

Provided in Cooperation with:

Center for Latin American Monetary Studies, Mexico City

Suggested Citation: Platitas, Reizle Jade C.; Ocampo, Jan Christopher G. (2025) : From bottlenecks to inflation: Impact of global supply-chain disruptions on inflation in select Asian economies, Latin American Journal of Central Banking (LAJCB), ISSN 2666-1438, Elsevier, Amsterdam, Vol. 6, Iss. 1, pp. 1-14,
<https://doi.org/10.1016/j.latcb.2024.100141>

This Version is available at:

<https://hdl.handle.net/10419/336418>

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Latin American Journal of Central Banking

journal homepage: www.elsevier.com/locate/latab

From bottlenecks to inflation: Impact of global supply-chain disruptions on inflation in select Asian economies

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ARTICLE INFO

JEL Classification:

E31
E52
F10
C1

Keywords:

Inflation
Global supply chains
Monetary policy

ABSTRACT

Supply-chain bottlenecks emerged alongside unprecedented inflationary surges amid the resulting mismatches in supply and demand for goods and services throughout the COVID-19 pandemic. This study employs a local projection approach to investigate the inflationary impact of global supply-chain pressures in the Philippines and select East Asian neighbors. We find that supply-chain disruptions are followed by sizable and statistically significant increases in headline inflation in the Philippines, Rep. of Korea, Thailand, and Singapore. Supply-chain shocks also have a considerable impact on the tradable segment of core inflation. Meanwhile, non-tradable inflation has a generally smaller, short-lived, and insignificant response to global supply-chain pressures reflecting the limited presence of second-round, indirect effects.

1. Introduction

Before the COVID-19 pandemic, inflation in East Asia was generally low and stable. Countries such as Indonesia, Malaysia, the Philippines, ROK, Singapore, and Thailand have all kept inflation within target and maintained well-anchored inflation expectations. However, the region was not impervious to the pandemic-induced rise in consumer price inflation. As Asian economies become increasingly integrated into the regional and global networks of production, understanding how the severe bottlenecks along these supply chains could impact inflation dynamics becomes important for policymakers.

The early stages of the COVID-19 pandemic saw a shift in household spending from contact-intensive services towards more durable goods as people sheltered in place. Consumer spending was further fueled by the range of monetary and fiscal stimulus that governments extended. At the same time, factory shutdowns and stringent pandemic restrictions caused a long list of shortages including that of labor and intermediate inputs. This mismatch of an overheating demand and constrained supply is at the core of global supply-chain (GSCs) disruptions often characterized by longer delivery times, heavily congested ports, and record-high shipping costs. Coinciding with these recurring and sizeable strains in the supply chain is the record-high inflation in many parts of the world.

This study aims to estimate the impact of GSC pressures on headline inflation and its sub-components for Indonesia, Malaysia, the Philippines, ROK, Singapore, and Thailand and compare it with global commodity price shocks. We wish to draw insights on the extent of the direct and indirect effects as exhibited on the response of the tradable and non-tradable segment of CPI inflation. The approach

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¹ The views expressed in this paper are those of the authors and do not represent the official position of the Bangko Sentral ng Pilipinas. The authors would like to thank the academic advisors and participants of the 2023 Joint Research Program of CEMLA on Inflation, Expectations, and Forecasts as well as their colleagues at the Department of Economic Research for their comments and feedback.

<https://doi.org/10.1016/j.latab.2024.100141>

Received 20 December 2023; Received in revised form 20 May 2024; Accepted 4 June 2024

Available online 15 June 2024

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follows Benigno, Di Giovanni, Groen, and Noble (2022) and Andriantomanga, Bolhuis, and Hakobyan (2023), which examined the contribution of GSC pressures to the recent bout of inflation surge in the US and Euro area and in sub-Saharan Africa, respectively. To this end, the paper follows a string of recent literature that utilizes the local projection model proposed in Jordà (2005) to examine the response of different inflation measures to exogenous shocks in GSCs. We also investigate whether the impact is limited to commodities and tradable goods prices i.e., direct first-round effects, or it extends to non-tradable goods and services inflation i.e., indirect, second-round effects.

Our empirical findings suggest that there is significant and sizable impact of GSC disruptions on headline inflation in the Philippines, Singapore, and Thailand. But the impact tends to build over time, happening at least after 6 months after the shock. By contrast, the impact of supply-chain pressures is felt earlier and for longer in a more advanced economy like the Republic of Korea (ROK). Meanwhile, supply-chain disruptions do not significantly influence headline inflation in Malaysia and Indonesia with headline inflation in these economies more prominently responsive to shocks in global commodities prices such as food and oil. Tradable inflation in the Philippines, Singapore, Thailand and ROK also rises in response to GSCPI shocks, consistent with these economies' reliance on imports of other manufacturing final goods. A look at the impact on non-tradable inflation found that there is generally insignificant impact of GSC disruptions except in the Philippines where there is a delayed albeit small response generated.

The key results suggest that shocks to global supply-chains tend to induce significant, sizeable, and persistent impact on headline, food, and tradable inflation in most Southeast Asian economies, but at a smaller scale compared to global commodity price shocks. The study highlights the importance of monitoring global supply chain pressures in addition to global commodity prices in decomposing the sources of supply-side pressures to analyze inflation dynamics. However, there is rather limited evidence of indirect effects reflected by the short-lived and small impact of GSC pressures on non-tradable inflation. The implication for optimal monetary policy would require a holistic look at the inflation-output stabilization tradeoff which can depend on factors such as the import share of consumption, degree of integration in global value chains, and strength of the central bank's monetary policy framework.

The next section sets the tone by discussing the developments in GSCs during the pandemic and the inflation dynamics across the economies in the current study—Indonesia, Malaysia, Philippines, ROK, Singapore, and Thailand. Section 3 details the analytical framework. The findings are discussed in Section 4. The paper concludes with policy implications and possible extensions.

2. Stylized facts and literature review

2.1. Measuring global supply-chain bottlenecks

2.1.1. Congestion in major ports bound global cargo capacity and delayed deliveries of intermediate inputs, eventually constraining production

International maritime transport accounts for more than 80 percent of the volume and 70 percent of the total value of merchandise traded among countries globally. Container ships have become the universal means of transporting a wide range of products. Asia accounted for almost two-thirds of container trade in 2018, followed distantly by Europe and North America (UNCTAD, 2019). As the backbone of trade, severe port congestion during the pandemic became a staple indicator of emerging bottlenecks.

The fraction of goods that cannot be loaded or unloaded in major ports around the world due to congestion is shown in Fig. 1A. At the onset of the pandemic in April 2020, about 8.7 percent of global cargo capacity was stuck in the largest ports. Driven mostly by the traffic in Shanghai and Zhejiang ports, this measure peaked at around 10.0 percent during the last quarter of 2021, double the 3-year pre-pandemic average. The surge is mainly due to COVID-19 outbreaks, extreme weather, and the broader cumulation of strains in the GSC network. Since the second quarter of 2023, shipping congestion started easing with only 4.2 percent of all shipped goods still in

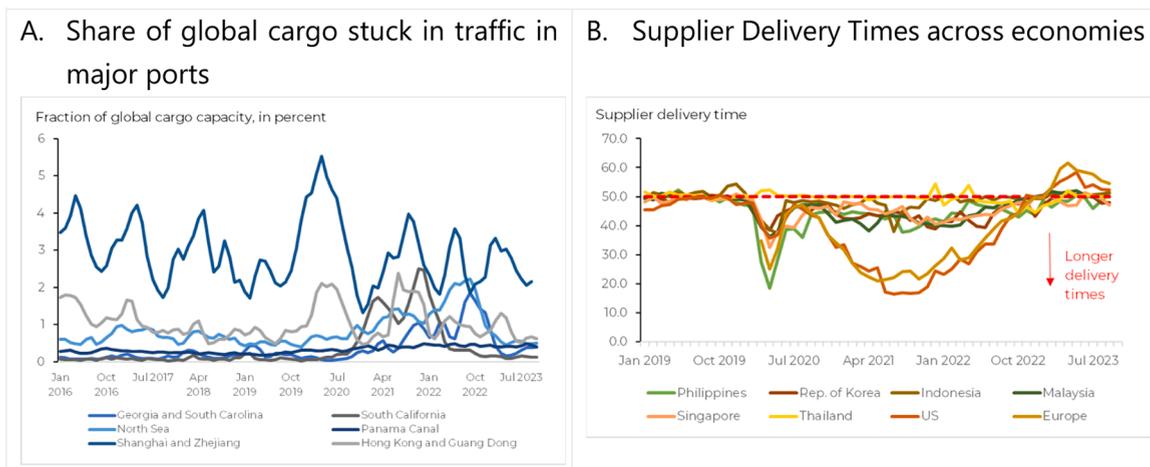


Fig. 1. Port congestions around the world prolonged supplier delivery times. Source: Kiel Institute for the World Economy, S&P Global manufacturing PMI

congestion, nearing the average of the years before the pandemic.

Longer lead times were another palpable indication of the supply-chain challenges that producers faced. During periods of normalcy, delivery times tend to shorten when economic activity is slow while longer waiting times are associated with periods of expansion as upstream firms take time to adjust production in response to strong demand. However, a salient feature during the pandemic is that the unprecedented lengthening of delivery times coincided with the strong demand for durable goods and plummeting activity, first during the increase in durables purchases at the first wave of lockdowns in 2020Q2, and again during the reopening of economies in 2021. This can be interpreted as firms being constrained in their ability to secure inputs to keep up with the larger demand.

On a regional basis, longer delivery times were largely confined to Europe and the US, with Asia being far less affected by supply delays. After the sharp increase in lead times from March to April 2020, delivery times improved for the ASEAN-6 (Fig. 1B) Sector-wise, the delays are more extreme in the tech equipment sector, and other machinery & equipment manufacturers. Improvement in supplier delivery times in Asia began in 2022 primarily due to the reopening of Shanghai after COVID restrictions were rolled back. Even the highly strained semiconductor industry experienced an easing of the supply crunch as delivery times shrank by the second half of 2022.

The faltering of demand-side drivers in 2023 relieved some of the pressures along the GSC networks, reducing bottlenecks. Post-COVID normalization gave way to tightening financial conditions, rotation away from goods to services, and slow-down of global economic activity which together put downward pressure on Asia's production network.

2.1.2. Lockdowns, labor shortages, and logistics network strains pushed shipping costs to record highs, dragging industrial production momentum

As early as the second half of 2020, freight costs were sharply rising on shipping routes from around the world as indicated by the Baltic Dry Index (BDI), a widely used index that measures the changes in the transportation freight rates of raw materials to multiple shipping paths (Fig. 2A). The surge in shipping costs in the wake of the pandemic was explained largely by supply constraints amid an imbalance between strong demand for goods and a shortage of labor and containers. Meanwhile, global demand recovery fueled the spike in 2021.² Shipping costs began soaring by the second half of 2020 and by the third quarter of 2021, shipping containers by sea freight rose by over 600 percent relative to pre-pandemic levels (Carrière-Swallow et al., 2023). The cost of shipping from China's major ports of Shenzhen and Ningbo-Zhoushan, the world's largest port by cargo tonnage, to various points in Southeast Asia reached record highs in October 2021.³ As consumer goods demand retreated in 2022, the COVID-era surge in shipping costs started pulling back.

Manufacturing in most emerging markets in Asia contracted sharply from March 2020 until the end of the second quarter of that year (Fig. 2B). A broad-based recovery in manufacturing began in early 2021, with most economies in developing Asia remaining above the 50 threshold that separates expansion from contraction.

2.1.3. Global supply-chain pressure index (GSCPI) brings it all together

Shipping costs, supplier delivery times, port congestions, and manufacturing activity are only a few of the several measures to assess the state of GSCs. While these indicators capture specific aspects of the supply-chain dynamics, the Federal Reserve Bank of New York developed a new composite indicator called the Global Supply-Chain Pressure Index or GSCPI to capture the multi-dimensional nature of supply-chain disruptions. The index has 27 components, 21 of which are purchasing managers indexes for three sub-components including backlogs, purchased stocks, and delivery times for seven major economies—the United States, European Union (EU), United Kingdom, China, Japan, South Korea and Taiwan. The rest are airfreight and ocean freight indexes in major trading routes (Benigno et al., 2022). The index is calculated monthly and is expressed in terms of standard deviation from its historical average.

Before the pandemic, there were a few notable spikes in GSCPI as seen in Fig. 3. One was during the Global Financial Crisis in 2008, and another in 2011 when two major natural disruptions occurred — the earthquake in Japan and huge floods in Thailand. The impact of the disasters in Japan mainly disrupted automobile production and distribution. The index was also above the historical average at the height of the US-China trade tensions in 2018 to early 2019. However, these episodes were overshadowed by a substantial rise in the index seen during the COVID-19 pandemic.

The first peak was in April 2020 when the index rose three standard deviations away from its historical average which coincided with the widespread lockdowns and border closures around the world. It improved briefly towards the end of 2020 but started rising again in 2021 amid new COVID variants and the Suez Canal blockage. Renewed pressures driven by major port closures in China and the trade-related sanctions in Russia's invasion of Ukraine sustained pressures on supply chains until April 2022. Since then, the GSCPI showed signs of easing albeit still elevated by historical comparison for the rest of 2022. Since then, the pressures have steadily eased.

2.2. Implications on inflation dynamics and outlook in East Asia

2.2.1. Although commodity prices play a particularly important role in driving inflation in Southeast Asia, the region's integration into GSC adds a layer of vulnerability

Before the pandemic, inflation in East Asia was generally low and stable. Further, the economies in the current study—Indonesia,

² ECB Economic Bulletin, Issue 3, 2021. <https://www.ecb.europa.eu/pub/economic-bulletin/html/eb202103.en.html>

³ Siqui, Ji. "China shipping to Southeast Asia sees prices surge tenfold as reopening demand picks up." *The South China Morning Post*, December 10, 2021. <https://www.scmp.com/economy/china-economy/article/3159054/china-shipping-southeast-asia-sees-prices-surge-tenfold>

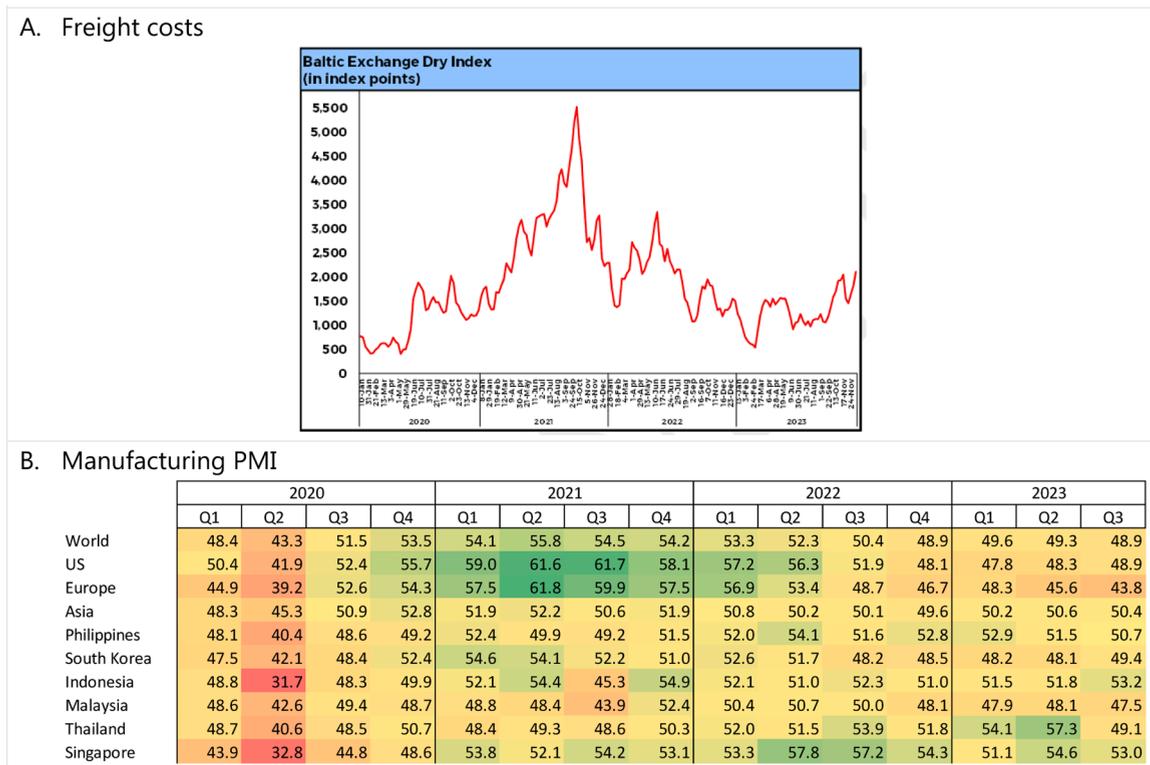


Fig. 2. Surges in seaborne cargo costs and slow-down in manufacturing activities. Source: CEIC, S&P Global manufacturing PMI

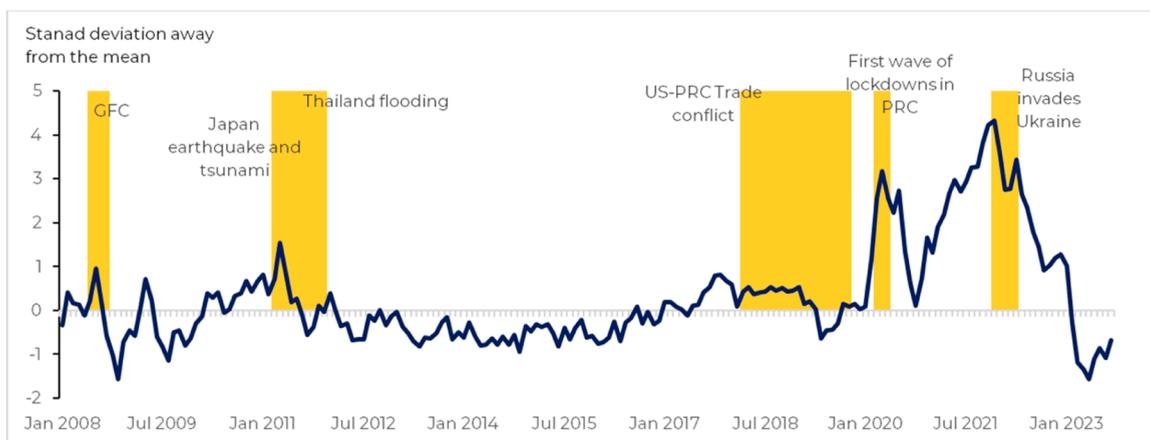


Fig. 3. The evolution of global supply-chain pressures. Note: Values of the index are normalized to zero and reported as standard deviations from the average index value. Source: Federal Reserve Bank of New York.

Malaysia, Philippines, ROK, Singapore, and Thailand—have all kept inflation expectations well-anchored (BIS Papers No. 89). In explaining overall price movements, some common factors drivers appear to be dominant.

Fuel and food account for about 40% of Malaysia’s CPI basket hence external shocks to these commodities transmit the most to its inflation. As a net energy importer, oil price was also responsible for most of the inflation in Thailand while the peaks in Indonesia’s inflation were usually associated with volatile food dynamics (Hendar, 2016; Singh, 2016; Manopimoke, 2018). Inflation in these economies is predominantly driven by supply-side shocks due to their heavy dependence on commodity exports. But before introducing key fiscal reforms, the controlled prices for administered goods and the existence of subsidies for energy and public transportation items curbed to some extent the impact of external shocks in the case of Indonesia, Malaysia, and Thailand. External supply

shocks are likewise key inflation drivers in the Philippines, ROK, and Singapore who are among the most open economies in terms of trade.

While participation in the global sharing of production opens opportunities for economic upgrading, it also creates vulnerabilities as shocks can be transmitted along these supply and value chains. If a domestic sector is heavily reliant on intermediate inputs from countries that suffer from severe bottlenecks, that sector has greater exposure to foreign supply-chain disruptions. This can push prices up if demand for the sector's output increases at a rapid pace.

Economies in East Asia have increased their import content of exports as measured by its backward GVC participation since 2000 up to the run-up to the GFC only to slightly abate amid the trade conflict between the US and China before the pandemic (Fig. 5). The backward perspective captures what proportion of a sector's exports rely on foreign value-added. In the case of the Philippines, Indonesia, and Thailand, this is driven mostly by the expanding GVC activities in the Electrical and Optical Equipment Sector, mostly focusing on more downstream stages such as product-testing and packaging (ADB 2022).

Aside from the margin cost channel, that is the increase in prices at home due to higher imported input costs, a more direct way by which supply-chain disruptions, primarily shipping costs, can influence prices is through final goods imports. The strategic complementarities channel is when domestic firms adjust their prices to respond to foreign competitors' higher prices to prevent losing market shares at home (Amiti, Heise, and Wang, 2021).

2.3. Empirical evidence on the impact of GSCs pressures on inflation

Several recent studies found empirical evidence showing a significant impact of global supply-chain bottlenecks on domestic inflation in advanced and emerging economies alike.

Igan, Rungcharoenkitkul, and Takahashi (2022) used a simple vector autoregressive (VAR) model to estimate that bottlenecks contribute at least 1.5 percentage points to inflation in the US and euro area in 2022. They also posited that economies with a larger share of exports and imports in intermediate goods tended to see larger falls in industrial output and stronger price inflation surges recently. Outsized impact on US and euro area inflation are also documented in Di Giovanni, Kalemli-Özcan, Silva, and Yildirim (2022) and Cavallo and Kryvtsov (2022) who further noted that inflationary effects last within three months, with greater effects in trade-intensive sectors.

Using a local projection model, (Carrière-Swallow et al., 2023) found non-negligible increases in various measures of inflation following shocks to global shipping costs. Effects vary based on country characteristics and monetary policy frameworks where impact is higher for countries with a higher share of imports in their consumption and those with more credible monetary authority that delivered low inflation historically. Meanwhile, Ascari, Bonam, and Smadu (2024) emphasized that monetary policy should carefully approach fending off global supply chain pressure shocks depending on how reliant an economy's domestic production is on global value chains. Bai, Fernández-Villaverde, Li, and Zanetti (2024) showed empirically that supply chain disruptions enhance the effectiveness of contractionary monetary policy in taming inflation but reduce the sensitivity of output to the policy.

Celasun, Hansen, Mineshima, Spector, and Zhou (2022) found that economies with higher shares of foreign value added in their domestic manufacturing output experienced larger disruptions during the pandemic as they were more vulnerable to shutdowns that hampered upstream production. Before (Carrière-Swallow et al., 2023) the pandemic, the Philippines was getting more integrated with the global sharing of production as reflected by its growing backward participation in GVCs. The implied downstreamness and the unpredictability of when the next supply-chain crunch can happen make understanding how the pandemic-induced disruptions contributed to domestic inflation dynamics is an important consideration to guide the conduct of monetary policy.

3. Empirical methodology

3.1. Data

To quantify the impact of supply-chain disruptions on domestic inflation, we use monthly data on four consumer price index (CPI) measures — headline, food, tradables, and non-tradables. The tradable and non-tradable components of core inflation are constructed using the disaggregated CPI series in each country of interest. The covered periods for each economy vary depending on the availability of disaggregated data with consistent classification. In countries whose central banks have adopted the inflation-targeting (IT) framework, the analysis focused on the IT Period.⁴ It is also of interest to us whether firms use price changes observed along the supply chain to form their views about future inflation. To this end, we also look at impulse responses of the month-ahead median inflation from Bloomberg's survey of private forecasters to the supply chain shocks.

The condition of global supply chains is proxied by GSCPI as a summary indicator of the key aspects of the supply-chain bottlenecks. Further, we include control variables to account for both global and domestic factors. The baseline specification also includes world food and oil prices, and the world output gap. Adding global food and oil inflation enables us to control for global demand affecting the supply-chain strains. It also allows a comparison of the impacts of supply-chain shocks and key commodity prices as these are the often-cited inflation drivers during the pandemic.

The domestic output gap is used to control domestic conditions. To conform with the monthly frequency of the rest of the data set,

⁴ As of 2023, Bangko Sentral ng Pilipinas, Bank Indonesia, Bank of Korea, Bank of Thailand are all inflation-targeters while the Monetary Authority of Singapore and Bank Negara Malaysia maintains the stability of their respective currencies.

the monthly output gap is made to be constant and equivalent to the quarter to which the month belongs.

To check the robustness of the results, we also use data on market volatility, monetary policy rates, and exchange rates. In particular, we add to the model the Chicago Board of Options Exchange Market Volatility Index (VIX), cross-country policy rates, and the nominal effective exchange rate (NEER).

3.2. Analytical framework

To understand the channels by which GSC pressures affect inflation, we first express the headline consumer price index P_t as follows:

$$P_t = (P_t^T)^\delta (P_t^N)^{1-\delta}$$

where T and N denotes the tradable and non-tradable sectors in the economy, and δ is the share of tradable goods in the consumption basket. Both sectors are assumed to be using inputs from each other. Let m be the share of the tradable goods that are imported from the rest of the world. modeling exogenous supply-chain shocks at time t denoted by $\tau_t^S > 1$, we write:

$$d \ln P_t = (\delta m + (1 - \delta)\gamma^N) d \ln \tau_t^S + \epsilon_t$$

The first term of the above equation reflects how supply-chain shocks directly raise the price of imported goods. The effect via the non-tradable sector occurs due to its spending on imported inputs, denoted in share terms by γ^N . This indirect, second-round effect is captured by the second term of the above equation.

The paper follows a string of recent literature that employs the local projection approach by [Jorda \(2005\)](#). To estimate, we perform a sequence of ordinary least squares (OLS) estimation of the following reduced-form equation:

$$y_{t+h} = \alpha_h + \beta_h x_t + \sum_{j=1}^J \beta_{hj} x_{t-j} + \sum_{j=1}^J \delta_{hj} y_{t-j} + \sum_{j=0}^J \theta_{hj}^G \Delta X_{t-j}^G + \sum_{j=0}^J \theta_{hj}^D \Delta X_{t-j}^D + \epsilon_{t+h} \tag{1}$$

where h denotes the response horizon in months, $h = 0, \dots, H$; y_{t+h} is the year-over-year log change in the price index $t + h$; x_t is the GSCPI capturing exogenous supply-chain shocks. The set of controls includes the lags of y_t and x_t , X^G , the global factors i.e. global output gap, world oil, and food prices, and X^D include the domestic output gap and bilateral exchange rate against the dollar. To address potential seasonality in price series, J is set to 12. Newey-West heteroskedasticity and autocorrelation consistent (HAC) estimator is used to compute the robust standard errors.

One advantage of the local projection approach is impulse response functions (IRFs) can be generated directly from the regressions. Further, for sufficiently large sample sizes, these IRFs are more robust to misspecification compared to standard vector autoregressive (VAR) specifications ([Montiel Olea and Plagborg-Møller, 2021](#); [Nakamura and Steinsson, 2018](#)).

The forecast errors for the horizon h from the local projection in [Eq. \(1\)](#) is given by:

$$f_{t+h|t-1} \equiv (y_{t+h} - y_{t-1}) - P[y_{t+h} - y_{t-1} | \Omega_{t-1}] \tag{2}$$

where $\Omega_{t-1} \equiv \{\Delta y_{t-1}, z_{t-1}, \Delta y_{t-2}, z_{t-2}, \dots\}$. To estimate the forecast error $\hat{f}_{t+h|t-1}$, we get the residual of the following regression:

$$y_{t+h} - y_{t-1} = c_h + \sum_{i=1}^{L_y} \gamma_i^h \Delta y_{t-i} + \sum_{i=1}^{L_z} \beta_i^h \Delta z_{t-i} + f_{t+h|t-1} \tag{3}$$

Then we run the following regression and calculate its R^2 :

$$\hat{f}_{t+h|t-1} = \alpha_{z,0} z_{t+h} + \dots + \alpha_{z,h} z_t + \tilde{v}_{t+h|t-1} \tag{4}$$

4. Discussion of results

4.1. Impulse responses of inflation to global shocks

The response of headline inflation in the ASEAN-5 and ROK to a one standard deviation shock to GSCPI is reported in [Fig. 5](#) with the shaded region denoting the associated 90 percent confidence bands. We also show the impact of a one-standard-deviation shock on global commodity prices for oil and food as key drivers of inflation in the region.

A significant and sizeable impact of GSC disruptions is seen in the Philippines and ROK which tends to build over time, reflecting how the shock works itself through the different stages of the supply chain network ([Fig. 6](#)). In the Philippines, it peaks at 0.27 percentage point 11 months after 1 standard deviation shock to GSCPI and persists until the 13th month. The delayed albeit significant impact of supply-chain pressures can also be seen in the case of Thailand and Singapore. Further, the impact of supply-chain pressures is felt earlier and for longer in ROK, becoming significant in the 4th month until the 14th month from the initial GSCPI shock. Meanwhile, supply-chain disruptions do not play significantly into the headline inflation in Malaysia and Indonesia. Headline inflation in these economies is more prominently responsive to shocks in global food prices. Response of inflation to volatility in global oil prices

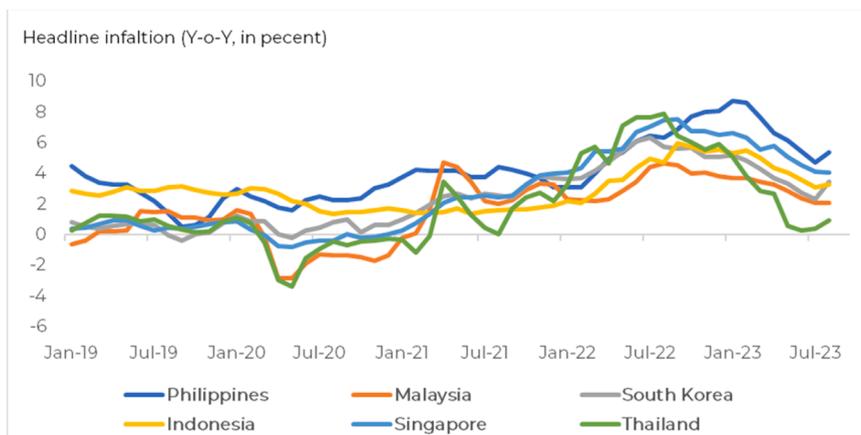


Fig. 4. Headline Inflation in the Philippines and select East Asian neighbors. Source: CEIC Data

is also immediate and significant in Malaysia, the Philippines, and Singapore.

The response of domestic food inflation to a one standard deviation shock to the GSCPI starts flat but becomes significant, albeit weakly, in the 9th month after the shock and stays so until the 12th month (Fig. 7). A swifter response is observed in ROK’s food inflation materializing significantly on the 3rd month and persisting until a year after the shock. As in headline inflation, the GSCPI shock did not elicit significant domestic food inflation responses from the other four economies. This may partly be explained by the growing interregional dependence on food supply-chain networks in Asia-Pacific which could be less susceptible to Trans-Pacific supply-chain bottlenecks. Understandably, food inflation responds more immediately and to a greater extent to world food price shocks.

Fig. 8 presents the responses of tradables and non-tradables segments of inflation. In the Philippines, GSCPI shocks have a sizable, significant, and more persistent impact on tradable inflation, rising by about half a percentage point 12 months after the GSCPI shock. The response is felt significantly beginning in the 4th month after the shock and stays elevated until one year later. The impact is also significant in ROK, Singapore, and Thailand’s tradables inflation. This is consistent with these economies’ reliance on imports of other manufacturing final goods which are transmitted through the direct channel. Second-round effects as reflected in the response of tradables inflation to global food and oil prices are quick to materialize and remain significant throughout the first year after the shock.

On the other hand, the response of non-tradable inflation is generally insignificant except in the Philippines where there is a delayed albeit small. This suggests the limited further second-round effects of supply-chain disruptions.

To prevent short-run supply shocks from spilling into the longer run, policymakers evaluate how these shocks are transmitted to inflation expectations. To get a sense of whether forecasters use disruptions along the supply chain to form expectations about aggregate inflation, Fig. 9 shows the response of month-ahead inflation expectations to the same shocks in GSCPI and global commodity prices. Inflation expectations are responsive to global food and oil prices in most economies in our sample. But only in the Philippines and ROK do the shocks to global supply chains have a significant impact on inflation expectations. This is similar to what was observed in the headline inflation impulse responses. As the current data limitation only allows us to look at one-month ahead inflation expectations, it must be noted that longer-horizon forecasts may better capture the forward-looking beliefs of the forecasters.

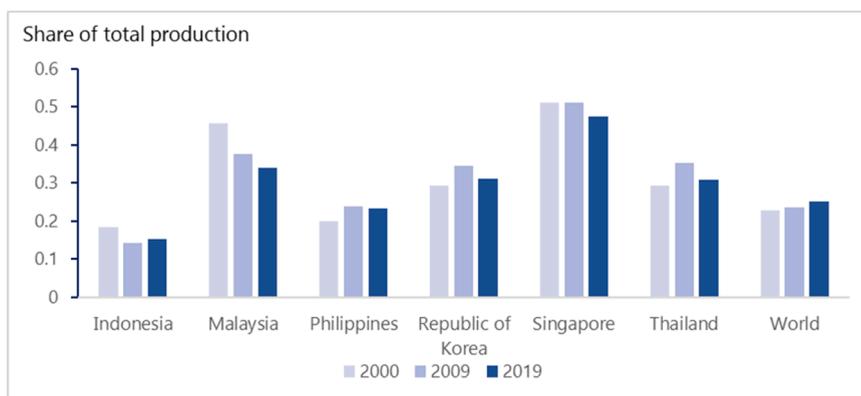


Fig. 5. Exposure to foreign supply-chain disruptions. Source: Asian Development Bank multi-regional input-output tables, authors’ calculation

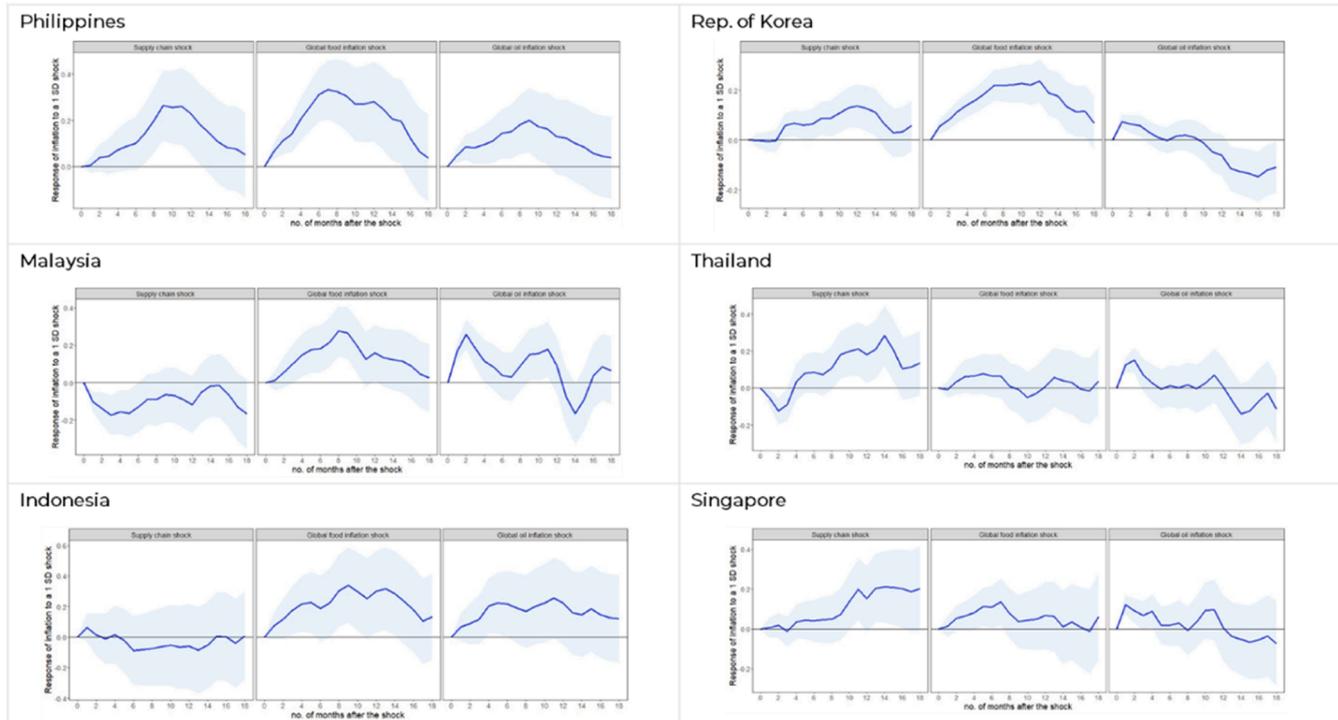


Fig. 6. Response of headline inflation to a one standard deviation shock in GSCPI, global oil and food prices.
 Source: Authors' calculations

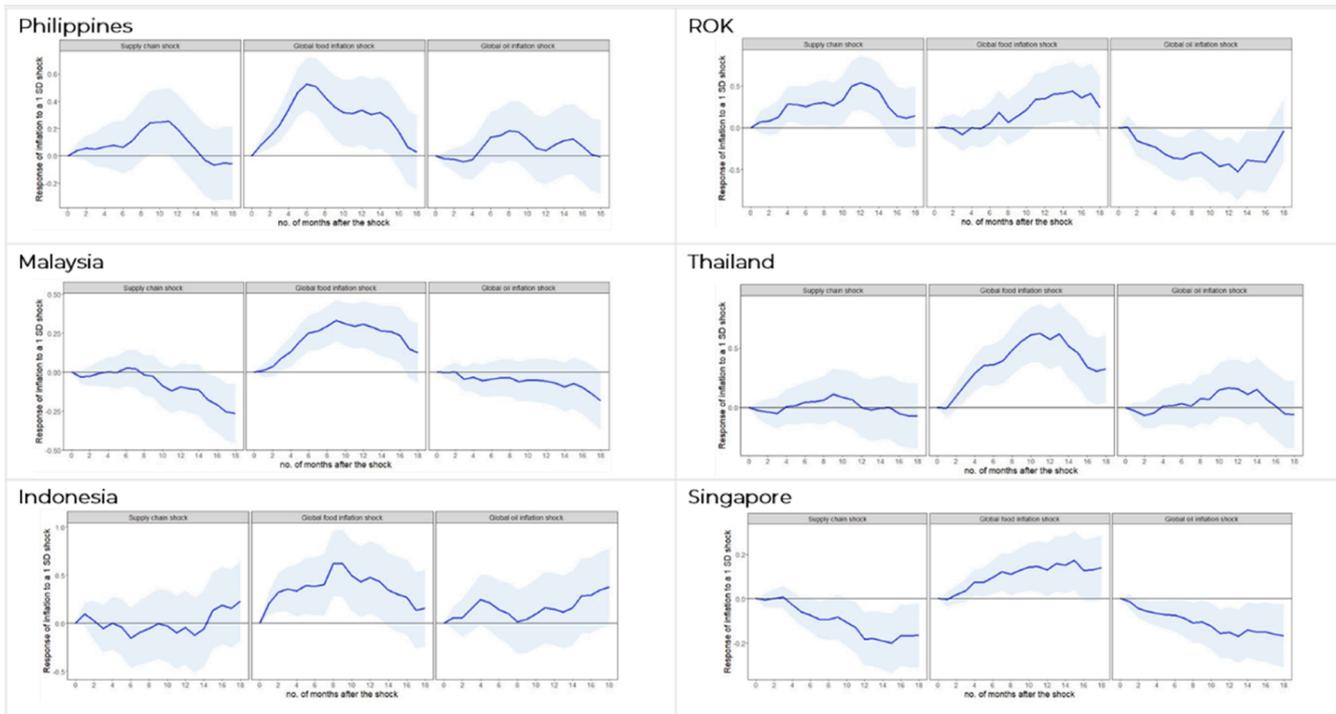


Fig. 7. Response of domestic food inflation to a one standard deviation shock in GSCPI, global oil and food prices.
Source: Authors' calculations

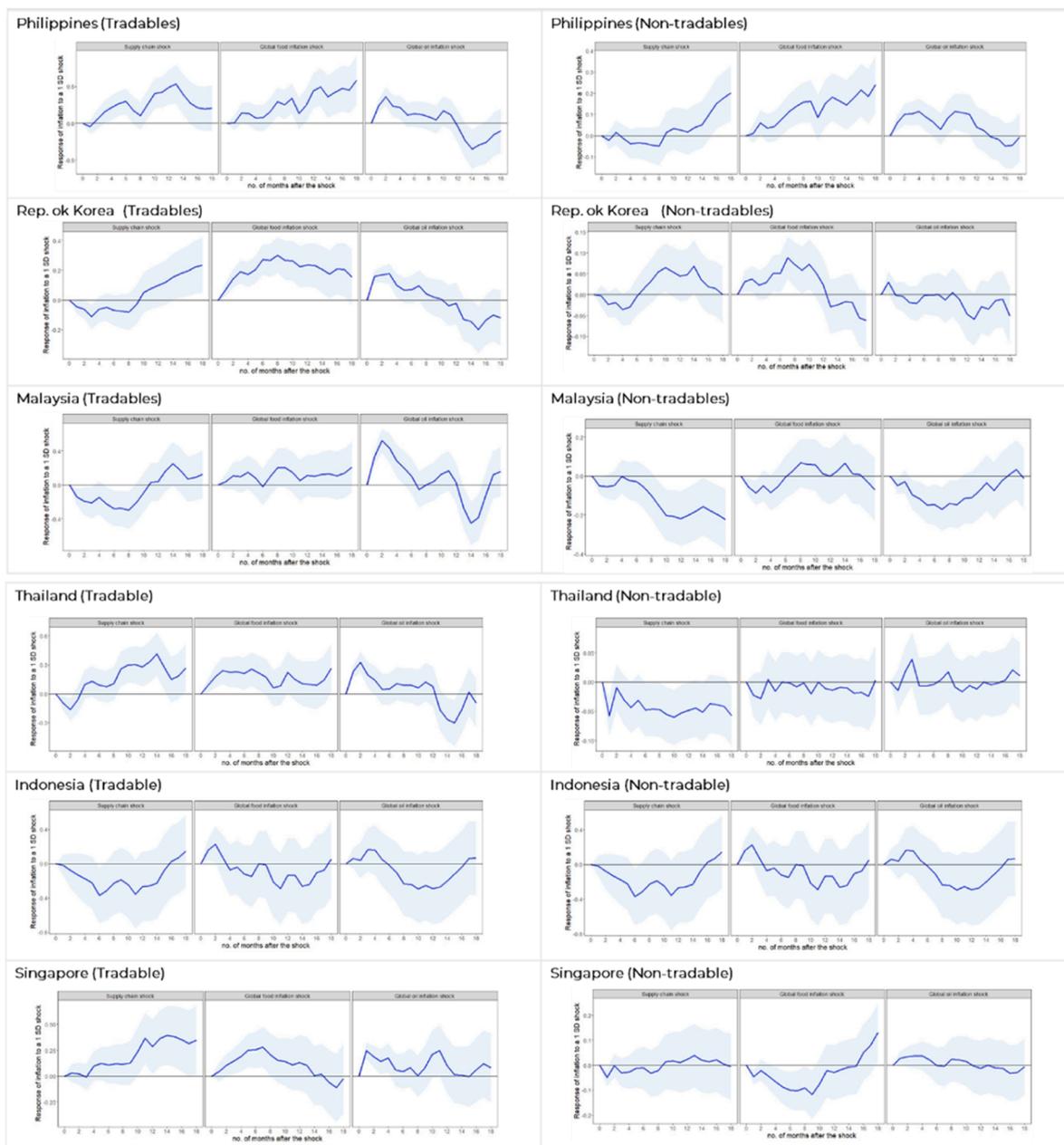


Fig. 8. Response of tradables and non-tradables inflation to a one standard deviation shock in GSCPI, global oil and food prices. Source: Authors' calculations

4.2. Forecast error variance decomposition

To construct the forecast error variance decomposition (FEVD), we follow the method introduced by [Gordnichenko and Lee \(2020\)](#). In essence, we regress the estimated forecast errors on the shocks from t to $+h$. The R^2 of this regression measures the share of the forecast error variance explained by the shock at horizon h .

In most economies in the sample, global supply chain shocks have a significant contribution to the forecast error variance of headline inflation in Malaysia, ROK and Thailand ([Fig. 10A](#)). Meanwhile, supply chain shocks have a limited contribution to forecast error variance in the Philippines and Singapore. Shocks to food prices are naturally the major contributors to the forecast error variance in domestic food inflation across economies ([Fig. 10B](#)).

The contribution of global supply chain shocks becomes more substantial in the forecast error variance of tradable inflation (Forecast 10C). In the case of Indonesia and Thailand, supply chain shocks contributed more to the forecast error than global oil and food inflation after a year. For Malaysia, the Philippines, and ROK, the forecast error variance remained dominated by the shocks to the

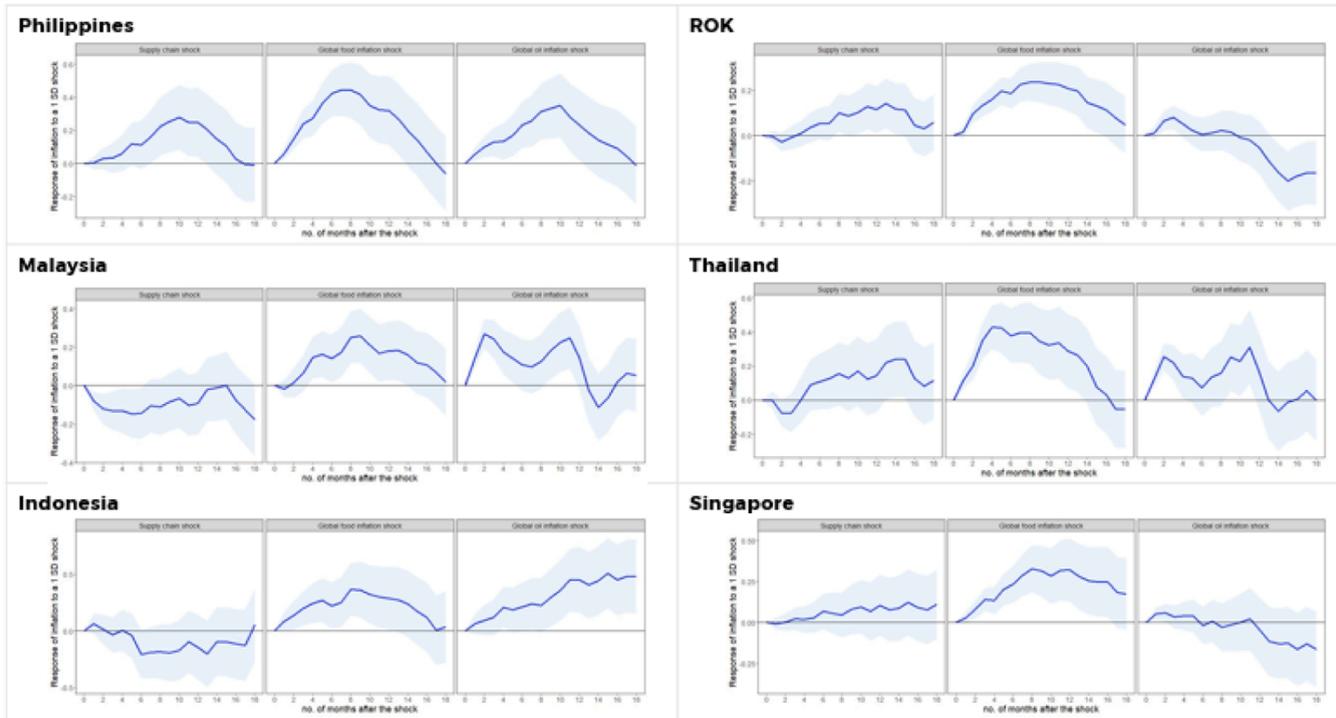


Fig. 9. Response of month-ahead inflation to a one standard deviation shock in GSCPI, global oil and food prices.
Source: Authors' calculations

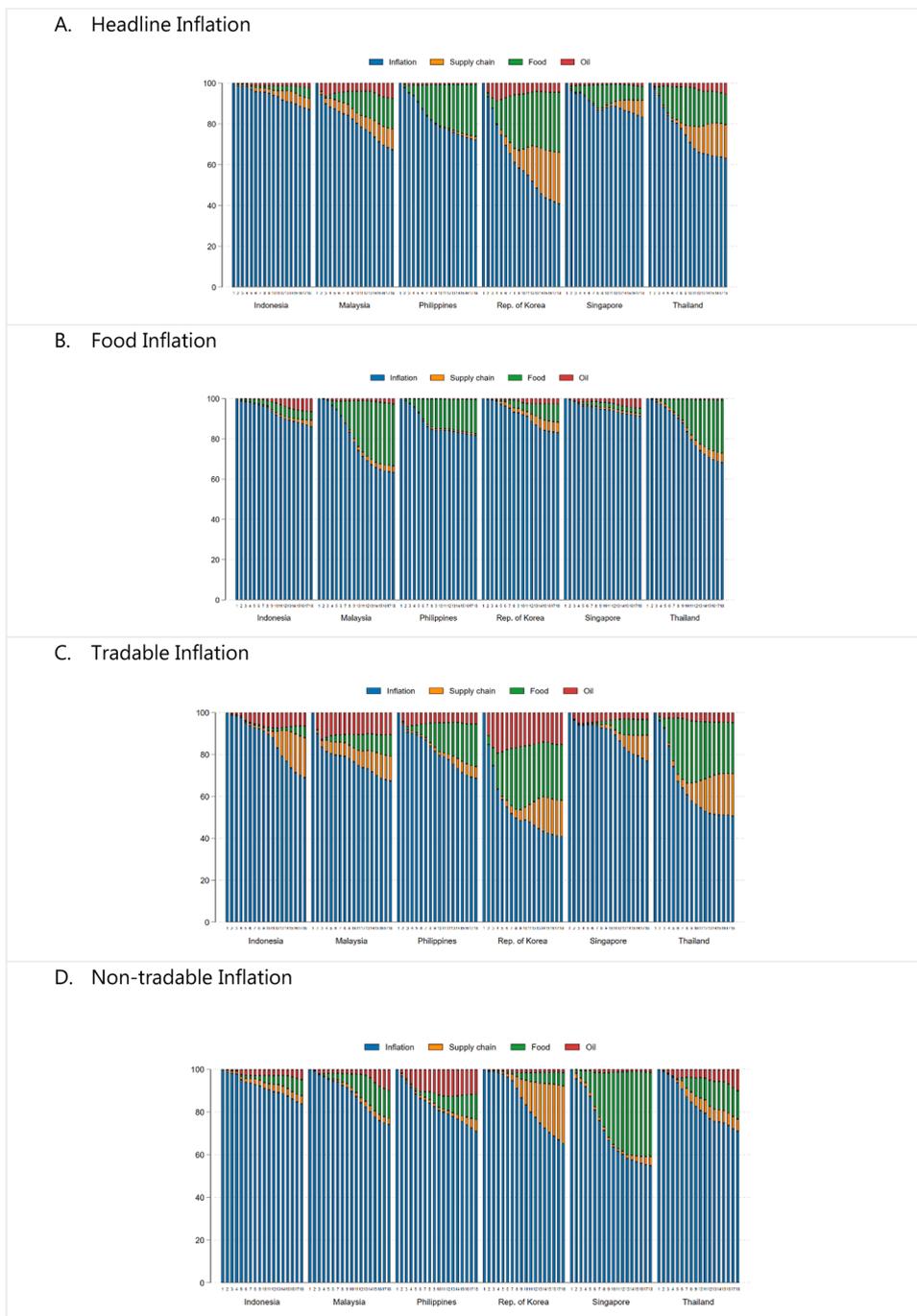


Fig. 10. Forecast Error Variance Decomposition.
 Source: Authors' calculations

commodity prices.

Global supply chain shocks have a significant contribution to the forecast error variance in non-tradable inflation in ROK. Relative to global commodities prices, supply chain shocks account for modest portions of the forecast error variance in non-tradable inflation (Fig. 4).

5. Conclusion and policy implications

Global supply chains are starting to show signs of recovery at the back of demand and supply realignment. However, the resolution of supply-chain bottlenecks remains largely uncertain given the size of the initial shocks brought about by such low-probability events like the COVID-19 pandemic and emerging geopolitical conflicts.

Using the local projection approach, the present study suggests that shocks to GSCs tend to induce significant, sizeable, and persistent impacts on inflation that cut through the food and tradable segments. We find that supply-chain disruptions are followed by sizable and statistically significant increases in headline inflation in the Philippines, ROK, Thailand, and Singapore. Supply-chain shocks also have a considerable impact on the tradable segment of core inflation in most of the economies analyzed. Nevertheless, these impacts are still smaller and in scale and less persistent relative to the influence of global commodities prices on the same measures of inflation. Meanwhile, non-tradable inflation has a generally smaller, short-lived, and insignificant response to global supply-chain pressures reflecting the limited presence of second-round, indirect effects.

While the current study focused on emerging economies in Southeast Asia, several recent works have also found evidence of significant contribution of supply-chain pressures to a surge of inflation during the pandemic in the US and the Euro area (Benigno et al. (2022); Finck and Tillman (2022); LaBelle and Santacreu, 2022).

There are several possible avenues for future research. The study can be extended using country- and region-specific measures of supply chains as regionalization of GSCs and near-shoring are gaining more traction in the recent years. To draw insights on the right monetary policy response, the analysis could also investigate the non-linear effects of supply chain disruptions with respect to different dimensions such as income level, GVC integration and monetary policy framework.

Prudent assessment of the role of supply bottlenecks in near-term and medium-term inflation dynamics is crucial from a monetary policy perspective. As there is a wider range of factors that drive inflation other than supply bottlenecks, as has been the narrow focus of this paper, and bottlenecks will eventually be resolved, the sensible response from central banks is to tolerate a temporary increase in inflation while continuously monitoring global supply chain pressures in addition to global commodity prices.

CRedit authorship contribution statement

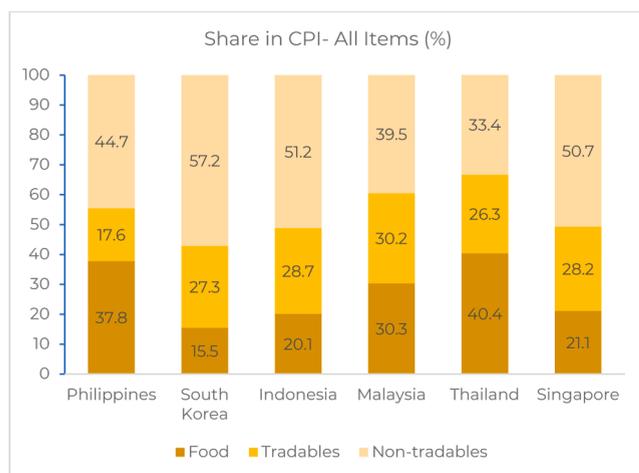
Reizle Jade C. Platitas: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Validation, Visualization, Writing – original draft. **Jan Christopher G. Ocampo:** Formal analysis, Supervision, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

ANNEX

A. Decomposition of CPI inflation



References

- Amiti, M., Heise, S., & Wang, A. (2021). High Import Prices along the Global Supply Chain Feed Through to U.S. Domestic Prices. Federal Reserve Bank of New York Liberty Street Economics. <https://libertystreeteconomics.newyorkfed.org/2021/11/high-import-prices-along-the-global-supply-chain-feed-through-to-us-domestic-prices>.
- Andriantomanga, Z., Bolhuis, M.A., Hakobyan, S., 2023. Global Supply Chain Disruptions: Challenges for Inflation and Monetary Policy in Sub-Saharan Africa (No. 2023/039). International Monetary Fund.
- Ascari, G., Bonam, D., Smadu, A., 2024. Global supply chain pressures, inflation, and implications for monetary policy. *J. Int. Money Finance*.
- Asian Development Bank (ADB), 2022. Key Indicators 2022. <https://www.adb.org/publications/asian-economic-integration-report-2022>.
- Bai, X., Fernández-Villaverde, J., Li, Y., Zanetti, F., 2024. The Causal Effects of Global Supply Chain Disruption On Macroeconomic outcomes: Theory and Evidence. Mimeo.
- Benigno, G., Di Giovanni, J., Groen, J.J., Noble, A.I., 2022. The GSCPI: a new barometer of global supply chain pressures. Federal Reserve Bank of New York Staff Reports 1017.
- Carrière-Swallow, Y., Deb, P., Furceri, D., Jimenez, D., Ostry, J.D., 2023. Shipping costs and inflation. *J. Int. Money Finance* 130, 102771. <https://doi.org/10.1016/j.jimonfin.2022.102771>, 2023ISSN 0261-5606.
- Cavallo, A., & Kryvtsov, O. (2022). "What can stockouts tell us about inflation? Evidence from online micro data", NBER Working Paper Series, no 29209, September.
- Celasun, O., Hansen, N., Mineshima, A., Spector, M., & Zhou, J. (2022). "Supply bottlenecks: where, why, how much and what next?", IMF Working Papers, no 2022/031.
- Di Giovanni, J., Kalemli-Özcan, S., Silva, A., & Yildirim, M.A. (.2022). "Global supply chain pressures, international trade, and inflation." NBER Working Paper 30240.
- Finck, D., Tillmann, P., 2022. The macroeconomic effects of global supply chain disruptions. *Work in Progress*. University of Giessen.
- Gorodnichenko, Y., Lee, B., 2020. Forecast error variance decompositions with local projections. *J. Bus. Econ. Statist.* 38 (4), 921–933. <https://doi.org/10.1080/07350015.2019.1610661>.
- Hendar (2016)., Inflation mechanisms, expectations and monetary policy in Indonesia, BIS Papers No 89: 193–203.
- Igan, D., Rungcharoenkitkul, P., & Takahashi, K. (2022). Global supply chain disruptions: evolution, impact, outlook (No. 61). Bank for International Settlements.
- Jordà, Ó., 2005. Estimation and inference of impulse responses by local projections. *Am. Econ. Rev.* 95 (1), 161–182.
- LaBelle, J., Santacreu, A.M., 2022. Global supply chain disruptions and inflation during the COVID-19 pandemic. *Feder. Reserv. Bank St. Louis Rev.* 104 (2), 78–91.
- Manopimoke, P., 2018. Thai inflation dynamics in a globalized economy. *J. Asia Pacif. Econ.* 23 (3), 465–495. <https://doi.org/10.1080/13547860.2018.1446673>.
- Montiel Olea, J.L., Plagborg-Møller, M., 2021. Local projection inference is simpler and more robust than you think. *Econometrica* 89 (4), 1789–1823.
- Nakamura, E., Steinsson, J., 2018. Identification in Macroeconomics. *J. Econ. Perspect.* 32, 59–86.
- Singh, S., 2016. Economic changes, inflation dynamics and policy responses: the Malaysian experience. BIS Papers No 89, 335–343.
- UNCTAD, 2019. Review of Maritime Transport 2018 (United Nations publication. Sales No. E.17.II.D.10. New York and Geneva).