

Globalization and Inflation

Xiaofen Tan, Xinkang Wang, Yahan Yang*

Deglobalization and elevated inflation are important features of the current world economy. Will the reversing of globalization affect the level and formation mechanism of inflation in the countries (or regions)? This paper selects 163 sample economies and constructs an index system in measurement of globalization. On such basis, it integrates the index system into the hybrid Phillips curve under the condition of open economy to study the influence of globalization on inflation and the logical mechanism and to further evaluate the driving effect of deglobalization on global inflation. The result shows a deflation effect of globalization, and the effect decreases first and then grow as the globalization level of a country (or region) improves. To further investigate the formation mechanism of inflation, the paper decomposes inflation into inflation trend and inflation cycle. As far as inflation trend is concerned, trade globalization marked by participation in global value chain is the main driver of downward inflation trend in developed economies, while globalization of information and finance is the primary driver of downward trend in emerging and developing economies. As to inflation cycle, trade globalization makes inflation cycle of the countries (or regions) more sensitive to price of international commodities and forms a linkage through trade network. Since the outbreak of the major public health emergency in 2020, the reversing of globalization drove up inflation of the countries (or regions), and those with higher participation in global value chain have higher level of inflation.

Keywords: globalization, inflation, hybrid Phillips curve, global value chain, international commodities

1. Introduction

Globalization is the process of establishing interdependent networks of complex relations based on cross-border flow of goods, capital, people and information. Over the past 40 years, along with the wider economic, financial and social opening-up and advanced digitalization worldwide, trade in goods and services grew and cross-border flow of capital, technology and information expanded substantially, driving

* Xiaofen Tan, School of Economics and Management, Beihang University; Xinkang Wang (corresponding author, e-mail: washore20@163.com) and Yahan Yang, School of Finance, Central University of Finance and Economics. The authors thank anonymous reviewers and editors for their valuable suggestions. This paper is under the authors' own responsibility.

the course of globalization to speed up in a trend of “great convergence”. As technical advance brought down the cost of transportation and information communication and specialization was further refined, global industrial chains became a pivot of efficiency improvement and economic prosperity. However, more and more factors in recent years such as the trade disputes between the US and China, Brexit, the major public health emergency and geopolitical risks caused the revival of trade protectionism. The momentum of “deglobalization” has extended from economic to non-economic factors, and the trend of globalization has turned stagnant and even reversed (Qu and Yang, 2022).

Globalization significantly improved the diversity of goods supplied around the world countries, reduced their price of goods and cost of household consumption, brought down global prices, and kept global inflation at low levels. Deglobalization, however, is featured by regional grouping instead of globalization, trade protectionism instead of free trade, and security-oriented global value chain instead of efficiency-oriented chain. It generates effects on global economic development and pattern of division of labor, pushes up the cost of technical innovation, goods production and trade, and drives global prices to rise. An economy driven by globalization is highlighted by high growth and low inflation, while one in the context of deglobalization is featured by paralleled low growth and high inflation. This therefore makes it necessary to thoroughly study whether the reversing of globalization and its trend will affect inflation of the countries. By observing the evolvement of global inflation in 1970–2020 (see Figure 1), this paper finds that the general downward trend and convergence of global inflation is basically consistent with the accelerated course of globalization. Since the end of the 20th century in particular, global inflation hub has shifted downwards and correlation of inflation across the countries increased significantly in co-movement. On the other hand, global inflation surged since 2020, with year-on-year growth of monthly CPI in some developed economies hitting the high record since the oil crisis in the 1970s, while this high inflation coincided with the reversing of the globalization trend. MIT professor Forbes therefore raised the question “has inflation changed the globalization process” (Forbes, 2019a). On such basis, this paper studies to what degree and in what mechanism globalization influences inflation of the countries and evaluates to what extent the reversing of globalization pushes up inflation.

The paper first provides cross-border empirical evidence of the influence on inflation from globalization. Specifically, it adopts the log-logistic distribution fitting strategy with a sample of 163 economies to improve the globalization index proposed by the KOF Swiss Economic Institute and constructs a set of multi-dimensional globalization indicators, which cover flow of trade, finance, people and information and comply with the characteristic of world imbalance better. The

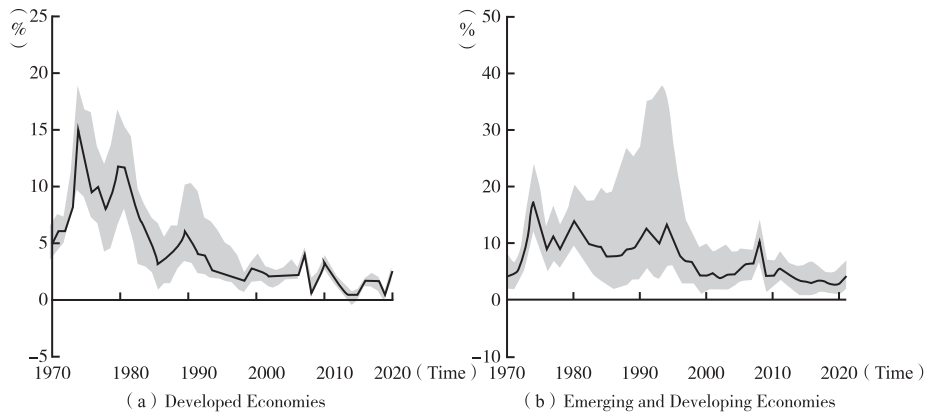


Figure 1. Evolution of Global Inflation

Note: The solid lines are the sample median of annual inflation rates and the shaded areas are upper/lower 25% quantile. 163 economies are sampled. Data source: Ha *et al.* (2021).

paper then includes the indicators into the hybrid Phillips curve under the condition of open economy to study the general influence of globalization on inflation. The result shows a deflation effect of globalization in a nonlinear way, and its influence on inflation appears to weaken first and then grow as the globalization level of a country (or region) improves. To further investigate the intrinsic mechanism, the paper breaks down the general globalization level into the four dimensions of trade, finance, flow of people and information and breaks down inflation into trend and cycle. It finds that trade globalization marked by participation in global value chain is the main driver of downward inflation trend in developed economies, while globalization of information and finance is the primary driver of the downward trend in emerging and developing economies. Trade globalization also makes the inflation cycle of the countries (or regions) more sensitive to price of international commodities and links the inflation cycle of the countries through trade network. The conclusions remain robust after taking financial factors, population aging and endogeneity of explanatory variables into consideration, changing the data processing method, using the HP filter method to calculate the output gap, and adopting the panel quantile regression. At last, the paper focuses on the fact that deglobalization and inflation are in parallel in the current economic operation and sets the proxy variable of deglobalization impact to quantitatively evaluate the inflation effect of deglobalization. According to the result, since the outbreak of the major public health emergency in 2020, deglobalization caused CPI inflation of the countries and core inflation to rise by 1.75% and 1.69% respectively on average and raised the inflation hub; the countries (or regions) in deeper participation in global value chain experienced higher level of inflation.

Marginal contribution of this paper lies in the following areas. First, it includes

globalization (or deglobalization) and inflation into the same research framework to provide valid evidence for influence of globalization on inflation. No consensus has been academically reached as to “will the process of globalization affect inflation of the countries”. Researches usually sample developed economies and a small number of emerging ones, making their conclusions less universal. In response, this paper selects 163 economies as sample to study the impact of globalization on inflation and its nonlinear characteristics and investigate the differences for different types of economies. On this basis, it focuses on the reversing of globalization since the outbreak of the major public health emergency in 2020 and quantitatively evaluates the inflation effect of deglobalization. Second, the paper adopts the standardized strategy of log-logistic distribution fitting to improve the KOF index. On the basis of leveraging its underlying construction logic and system merits, the improvement better complies with the imbalanced development of the world economy and can be applied to empirical study of economics as method reference and data support for related research. Third, the paper decomposes inflation into trend and cycle to analyze the intrinsic influencing mechanism. Other researches haven’t paid sufficient attention to the question “in what channels globalization affects inflation”. By breaking down actual inflation with the Hamilton filter method, this paper finds difference in the drivers for downward inflation trend in the long run for different types of economies and further discovers that trade globalization makes inflation cycle of the countries (regions) more sensitive to price of international commodities and results in spatial spillover of price fluctuations. These findings widen the current scope of research.

The remaining of this paper is structured as follows. The second part reviews literature, followed by the third part that improves the traditional KOF index for globalization. The fourth part conducts empirical analysis of globalization and inflation, and the fifth part studies the “inflation effect” of deglobalization. The last part draws conclusions with policy implications.

2. Literature Review

The topic of inflation has always been highlighted in economics study. Early research on inflation was confined to closed economy (Stock and Watson, 2010; Gordon, 2013; Blanchard, 2018) and covered unemployment or output gap (Orphanides and Norden, 2005; Clark and McCracken, 2006), inflation expectation (Rudd and Whelan, 2005 & 2006; Coibion and Gorodnichenko, 2015) and impact of monetary and financial conditions (Huybens and Smith, 1999; Bernanke and Gertler, 2001) on local inflation. As time went by, however, increasingly more evidence indicated that the positive correlation between domestic output gap and inflation was no longer robust; in another word, in a closed economy, the traditional Phillips curve turned increasingly flatter. Since the financial crisis in 2008 in particular, stimulated by the easy monetary

and fiscal policies across the countries, global economy resumed growth steadily, with unemployment going down. However, the rising margin of inflation across the countries was far below the expected and even entered the new normal of paralleled low interest rate and low inflation (Bernanke, 2020). Blanchard (2016) found the slope of the Phillips curve (correlation of unemployment gap and inflation) plunged by over 50% based on the U.S. quarterly data in 1960–2013. Hazell *et al.* (2022) detected the similar phenomenon according to the U.S. state-level commodity prices in 1978–2019 and explained it as anchoring of the long-run inflation expectation. Eser *et al.* (2019) studied Eurozone countries as samples, finding the correlation of wage and output gap was higher than that of price and output gap and further attributing the flattened Phillips curve partly to the narrowed corporate profit margins in general.

Globalization produced profound influence over the economic landscape of the world and offered a workable explanation for global inflation evolvement. In fact, no consensus has been academically reached as to “did globalization change the inflation process of the countries”. It was generally believed in the early days that the effects of globalization on inflation were mild and temporary (Ball, 2006; Mishkin, 2009). Ball (2006) raised the following three questions: whether globalization brought down long-term inflation, whether globalization changed the structure of the Phillips curve, and whether globalization produced material negative impact on the evolvement of inflation. His answer to the questions was negative. Stressing that the influence was like an interim supply shock, he believed it is groundless to think globalization would change the structure of the Phillips curve or produce material long-term impact on inflation. Mishkin (2009) held that though globalization intensified the cross-border competition of businesses, inflation remained a monetary phenomenon in the long term. On such basis, as long as central banks kept the monetary policy regulation framework stable, globalization would not exert lasting or fundamental influence on inflation. In other words, globalization was greatly overestimated as to its influence on inflation dynamics of the countries.

However, as the countries, especially developed economies, entered the new normal of lasting low inflation, some scholars started to re-examine the relations between globalization and inflation, believing the influence to be real and significant (Forbes, 2019a; Kamber and Wong, 2020). To explain the converging inflation across the countries, Kamber and Wong (2020) selected 7 developed economies and 21 emerging ones as research samples and found the international commodity price shock was a major driver for the common changes of inflation gap across the countries. Forbes (2019a) constructed a cross-border panel data set containing 31 developed economies and 12 emerging economies to answer “did globalization change the process of inflation”, concluding international commodity price, global output gap, exchange rate and other global factors would significantly affect the inflation evolvement and stressing “influence of global factors on inflation was no longer auxiliary”.

Comprehension of the relations between globalization and inflation is crucial to

policy makers, but in general, arguments over the topic remain unsolved and were in lack of strong evidence. First, the majority of researches have studied the influence of international commodity price, global output gap and other international factors on inflation in the context of globalization, yet the influence is in a large part the secondary consequence of globalization. The deepened globalization makes domestic inflation more sensitive to international factors, but the researches haven't answered the core question "did globalization itself affect inflation dynamics of the countries". Second, most researches have a sample size that is limited and usually include only developed economies and part of the economically fast-growing emerging economies. On the one hand, as a large number of developing economies are left out and the selected countries are generally highly globalized, the research conclusions reflect to a large extent the influence of globalization on inflation dynamics of developed economies, without horizontal comparison with less globalized countries. In this case, the selection bias of the samples would damage the overall reliability and robustness of the research conclusions. On the other hand, for developed economies and emerging and developing ones, the extent and mechanism of globalization affecting their inflation may vary. Due to the limited sample size, the difference among various types of economies cannot be compared through classification. Third, the intrinsic mechanisms and main channels of globalization affecting inflation still lack thorough and detailed economics explanations, yet they are the key to understanding the forming mechanism in the globalization context. Since the major public health emergency broke out in 2020, the trend of deglobalization has turned more intense, yet researches fail to provide the evidence of deglobalization driving inflation either.

3. Improvement of the Traditional Globalization Index

Since the 1990s, though the trend of global integration was definite, the course of globalization in different economies at different stages differed significantly. This made measurement of the globalization course in different countries (regions) a prerequisite for discussing globalization and inflation. Dreher (2006) constructed the KOF globalization index, which was updated by Gygli *et al.* (2019). Thanks to its complete indicator system, wide coverage of samples and highly available data, the index has been extensively applied in the academic study of economics and related policy reports worldwide. Specifically, based on the sub-index system, KOF index uses percentile ranking for standardization, setting the maximum value in the gross sample to 100 and the minimum value to 0, ranking the remaining observed value before assigning value one by one according to their percentiles, and eventually fitting the highly discrete data to a uniform distribution in the range of 0–100.

The method enjoys the strength of directly comparing the position of different countries (regions) in global ranking. Its underlying assumption, however, is that the globalization level of each economy is linear and in uniform distribution, which does not conform to the imbalanced development of the world today. Figure 2 (a) shows

the distribution of trade globalization across the countries (regions), featured by significant right skewed distribution, right long tail and left truncation. Figure 2 (b) illustrates the KOF trade globalization index result on a factual level, demonstrating low skewness and low kurtosis in the weighted KOF index distribution after uniform distribution fitting of sub-indicators. In reality, most countries (regions) are lowly globalized, with only a few being highly globalized. The standardization strategy of the KOF index therefore overestimates the globalization level of a large number of countries (regions) and ignores the inequality in to what extent each economy opens up. In empirical study, inclusion of the KOF index as a variable into modeling will introduce measurement error and cause biased inconsistency in the estimation result.¹

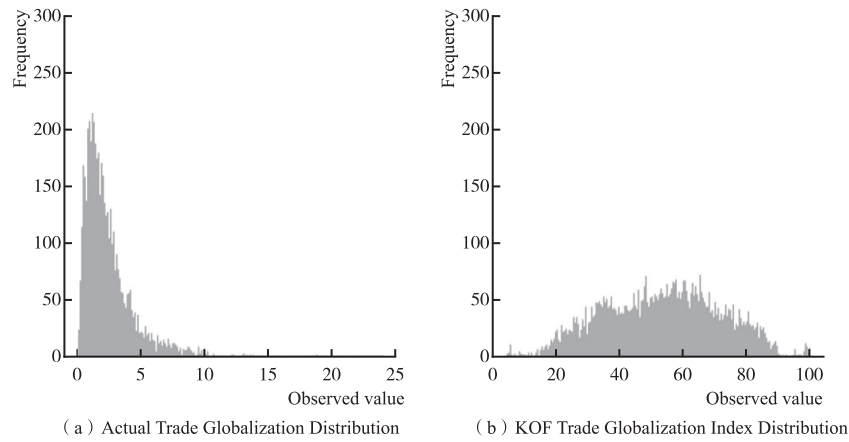


Figure 2. Comparison of Actual Trade Globalization and the KOF Index

Note: The left shows the share of trade volume in GDP after the HHI index weighting, and the right is the 2022 KOF trade globalization index on the factual level for the period of 1990–2019.

This paper uses the inverse cumulative distribution function for standardization of $[0,1]$ of the indicators.

$$GI^{-1}(x) = \int_{-\infty}^x f(x)dx \quad (1)$$

x is the ranking percentile of the observed value in gross sample.² In line with the actual globalization distribution, the paper makes the globalization level of each economy follow the log-logistic distribution:

¹ This paper evaluates the measurement error and regression bias of the uniform distribution fitting strategy through mathematical argumentation and simulation program. The evaluation process is kept for reference.

² Data source: KOF Swiss Economic Institute.

$$f(x) = \frac{\exp\left(\frac{\ln x - \mu}{\sigma}\right)}{\sigma x \left[1 + \exp\left(\frac{\ln x - \mu}{\sigma}\right)\right]^2} \quad (2)$$

Parameters μ and σ are the results of maximum likelihood estimation. According to the result in Figure 3, the log-logistic distribution is in better realistic fitting and can reflect the imbalance of globalization levels across the countries (regions).

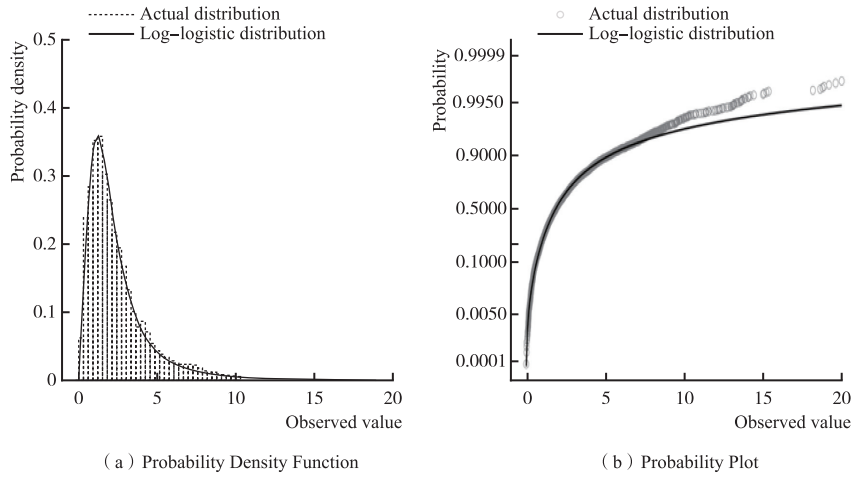


Figure 3. The Log-Logistic Distribution Fitting

Note: The left is a probability density function and the right is a probability plot (P-P Plot).

4. Empirical Analysis of Globalization and Inflation

4.1. Design of the Empirical Study

By referring to Borio and Filardo (2007) and Bianchi and Civelli (2015), this paper uses the hybrid Phillips curve under the condition of open economy to depict the formation mechanism of inflation in a country (region):

$$\pi_{i,t} = \beta\pi_{i,t-1} + \gamma\pi_{i,t}^e + \theta GAP_{i,t}^D + F'_{i,t}\delta + \alpha_i + \varepsilon_{i,t} \quad (3)$$

The subscript i and t respectively refer to individuals and time. π means inflation level and includes CPI inflation rate π^{cpi} and core inflation rate π^{core} . π_{t-1} is one period lag of inflation and π^e is long-term inflation expectation that is measured with inflation forecast in five years of an economy made by IMF in the current spring (Forbes, 2019b). CAP^D is domestic output gap, which is measured with the periodic term of real GDP growth in a country (region) after Hamilton filtering (Hamilton, 2018). On such basis, the

paper introduces a series of international factors F' to extend the closed Phillips curve to open economy. The factors include a country's globalization level GI , measured with the composite index of globalization developed in this paper, international commodity price CP , measured with annual percentage change of CRB index, and global output gap CAP^F , calculated with Hamilton filtering of real global GDP data obtained from the World Bank. α is individual fixed effect and ε is error term.¹

4.2. Empirical Result Analysis

4.2.1. Phillips Curve under Closed Conditions

According to the regression result in Table 1, for the gross sample, the new Keynesian Phillips curve does not perform well in terms of explained variable, CPI inflation rate and core inflation rate. On the one hand, although the regression coefficient of domestic output gap on CPI inflation rate and core inflation rate is positive, the degree of influence is extremely weak and both statistically insignificant. For 1% increase of domestic output gap, CPI inflation rate and core inflation rate rise by 0.02% respectively. On the other hand, the correlation between domestic output gap and inflation is not robust. The regression coefficient of domestic output on CPI inflation is significantly positive during global financial crisis, but positive correlation is not existent in other periods.

Table 1. Testing of the Phillips Curve under Closed Conditions

Variable	π^{cpi}			π^{core}		
	Gross sample	Not in global financial crisis	In global financial crisis	Gross sample	Not in global financial crisis	In global financial crisis
	(1)	(2)	(3)	(4)	(5)	(6)
π_{t-1}	0.3699*** (0.0281)	0.4102*** (0.0298)	-0.4602*** (0.0616)	0.4288*** (0.0492)	0.4029*** (0.0518)	-0.0686 (0.1298)
π^e	0.4074*** (0.0768)	0.3710*** (0.0794)	0.2160 (0.3741)	0.4893*** (0.1000)	0.5591*** (0.1243)	-0.4868 (0.3362)
GAP^D	0.0211 (0.0258)	-0.0437 (0.0283)	0.1515** (0.0538)	0.0155 (0.0235)	-0.0251 (0.0269)	0.0369 (0.0477)
R^2	0.2108	0.2572	0.1944	0.3013	0.3329	0.0362
adj. R^2	0.2102	0.2566	0.1889	0.2997	0.3313	0.0186

Note: Sample period of "in global financial crisis" is set as 2007–2009. ***, ** and * respectively represent statistical significance at the 1%, 5% and 10% level. In the parentheses are cluster robust standard errors. Notes are the same for the rest tables.

4.2.2. Phillips Curve in the Globalization Context

Next, the paper extends the new Keynesian Phillips curve to open economy and

¹ Descriptive statistics, data source and sample selection are kept for reference.

includes another three variables, namely globalization index (GI), international commodity price (CP) and global output gap (GAP^F). The regression result in columns (1) and (2) in Table 2 indicates the course of globalization significantly lowers the inflation level of the countries (regions). Specifically, with other factors controlled, when a country's composite globalization index increases by 0.1, its CPI inflation rate drops by 0.40% and core inflation rate by 0.19%, being significant at the 1% and 5% level. Such conclusions are basically consistent with the reality. Since the 1990s, as the course of globalization sped up, the cost of cross-border flow of goods, capital, people and information was reduced and the size grew significantly. Global integration broke the barriers among production factors of different levels, brought down equilibrium price through market competition, produced deflation effects and resulted in the inflation convergence across the countries (regions). In addition, international commodity price would significantly affect inflation levels of the countries (regions). According to the regression result, for 1% increase of the commodity price CRB index, on average, CPI inflation rate and core inflation rate of an economy rise by 0.06% and 0.02% respectively. It reminds us in the context of globalization, the global factor of international commodity price generates influence that cannot be overlooked on inflation of the countries (regions). It's observable that commodity price shock intensifies the global inflation resonance (Kamber and Wong, 2020). Core inflation is less sensitive to international commodity price than CPI inflation, because the highly volatile food and energy prices are deleted in core inflation and food and energy are heavily weighted in the CRB index.

For economies at different stages of globalization, the effects of globalization level on inflation are probably heterogenous. To test whether such effects are nonlinear, the paper introduces the quadratic term (GI^2) and cubic term (GI^3) of composite globalization index on the basis of the model (3). The regression result in the columns (3) and (4) in Table 2 reveals significant nonlinear characteristics of the effects. The fact that the quadratic term of globalization level is significantly positive and the cubic term is significantly negative fully indicates that as the globalization level improves, marginal effects of a country (region)'s globalization on inflation weaken first before being enhanced in an inverted U shape (Figure 4).

Table 2. Regression Result by Taking into Account Global Factors

Variable	π^{cpi}	π^{core}	π^{cpi}	π^{core}
	(1)	(2)	(3)	(4)
GI	-4.0296*** (0.8084)	-1.8590** (0.7398)	-19.0964*** (4.6021)	-16.7457*** (5.7122)

Variable	π^{cpi}	π^{core}	π^{cpi}	π^{core}
	(1)	(2)	(3)	(4)
GI^2			36.9406** (11.7100)	35.4708*** (13.0002)
GI^3			-22.3936** (8.7732)	-22.2140** (8.5841)
CP	0.0556*** (0.0049)	0.0172*** (0.0050)	0.0566*** (0.0050)	0.0178*** (0.0050)
GAP^F	-0.0086 (0.0446)	-0.0924 (0.0573)	-0.0202 (0.0443)	-0.0977 (0.0567)
Domestic factor	Yes	Yes	Yes	Yes
R^2	0.2543	0.3108	0.2585	0.3174
adj. R^2	0.2532	0.3078	0.2569	0.3134

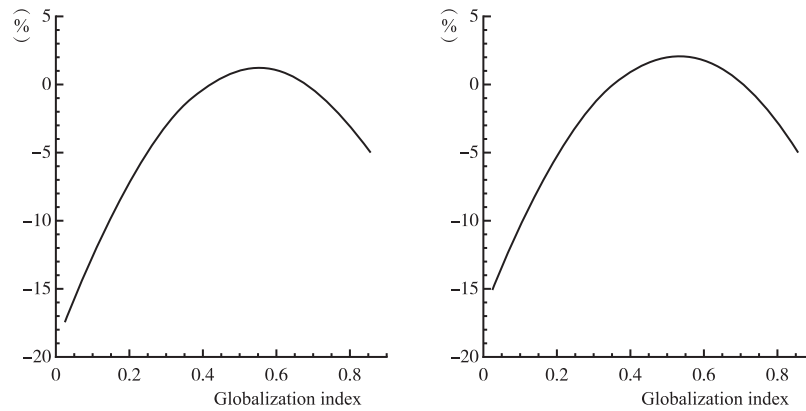


Figure 4. Marginal Effects of Globalization on Inflation

Note: According to the regression result fitting in Table 2, the horizontal axis ranges from the minimum value of the samples to the maximum value.

4.2.3. Mechanism Analysis: Globalization and the Inflation Trend

Table 2 provides the general cross-border law of globalization influencing inflation, and its intrinsic mechanism will be further analyzed. To better understand the logic of the influence, the paper uses Hamilton filtering to break down inflation of the countries (regions) into long-term trend and cycle. First, with the improved globalization index

system, the paper segments globalization into the four dimensions of trade (*TGI*), finance (*FGI*), flow of people (*PGI*), and information (*IGI*), and sets inflation trend as an explained variable. According to the regression result in Table 3, for 0.1 increase of information globalization, CPI inflation trend of emerging and developing economies drops by 0.46% and core inflation rate decreases by 0.30%. For 0.1 increase of finance globalization, core inflation trend of emerging and developing economies goes down by 0.78%.

Table 3. Effects of Globalization on the Inflation Trend

Variable	Developed Economies		Emerging and Developing Economies	
	<i>Trend^{cpi}</i>	<i>Trend^{core}</i>	<i>Trend^{cpi}</i>	<i>Trend^{core}</i>
	(1)	(2)	(3)	(4)
<i>TGI</i>	-1.7722 (1.4136)	-0.0581 (2.9284)	-0.0255 (1.2715)	1.1652 (3.1319)
<i>FGI</i>	-0.6754 (0.9233)	-0.9364 (2.6001)	-1.7543 (1.3733)	-7.8886*** (1.2058)
<i>PGI</i>	2.1618 (2.2154)	0.7994 (4.3901)	0.0354 (3.0532)	-12.9526 (9.9215)
<i>IGI</i>	-0.6044 (0.4183)	-0.3883 (0.9642)	-4.6344*** (1.2689)	-3.0284* (1.6097)
Control variable	Yes	Yes	Yes	Yes
R ²	0.4004	0.2494	0.1053	0.2452
adj. R ²	0.3951	0.2422	0.1029	0.2362

The conclusions help understand the nonlinear results in Figure 4. At the initial stage of globalization, i.e. the transition from relatively closed economy to open economy, corresponding regulations and policies reserve is usually needed, in order to include sufficient constraints to curb inflation. Driven by the discipline effects, therefore, finance globalization will produce significant curbing effects on inflation. As globalization deepens, the promoting role of opening-up for national (regional) economic and financial development starts to emerge, including the rapid growth of trade and the improvement of domestic financial status. Under such impact, domestic potential of economic growth is released and the rapid economic growth intensifies the upward pressure of inflation, weakening the inhibiting effect of globalization on inflation. Highly globalized countries (regions), mostly developed economies, tend to be higher in global value chain participation. As the participation increases, the deflation effect of globalization is enhanced.

4.2.4. Mechanism Analysis: Globalization and the Inflation Cycle

The result in Table 2 tells that with global factors taken into consideration, international commodity price will significantly affect inflation levels of the countries (regions). Next, this paper introduces the interaction term of globalization sub-indicators in different dimensions and international commodity price to investigate the effects of globalization on the inflation cycle. According to the regression result in Table 4, with globalization sub-indicators in different dimensions being controlled, the interaction term of trade globalization index and international commodity price ($TGI \times CP$) exerts significantly positive influence over CPI inflation cycle. In another word, as trade globalization level of a country (region) improves, its CPI inflation cycle is more sensitive to international commodity price.

Table 4. Effects of Globalization on the Inflation Cycle

Variable	$Cycle^{cpi}$	$Cycle^{core}$	$Cycle^{cpi}$	$Cycle^{core}$
	(1)	(2)	(3)	(4)
$TGI \times CP$	0.0712*** (0.0261)	-0.0107 (0.0192)	0.0925*** (0.0325)	-0.0126 (0.0218)
$FGI \times CP$			-0.0396 (0.0345)	-0.0179 (0.0288)
$PGI \times CP$			0.0486 (0.0490)	0.0391 (0.0485)
$IGI \times CP$			-0.0400 (0.0246)	-0.0145 (0.0168)
Control variable	Yes	Yes	Yes	Yes
R ²	0.0612	0.0210	0.0656	0.0222
adj. R ²	0.0596	0.0164	0.0632	0.0154

4.3. Robustness Test

Furthermore, the paper considers the financial factors, population aging and endogeneity of explanatory variables, changes the data processing method, uses the HP filter method to calculate the output gap, and adopts the panel quantile regression to test sensitivity of the empirical results to indicator selection and method setting. The result verifies the sound robustness of the research conclusions in this paper.¹

¹ The robustness test design and the regression result are kept for reference.

5. Inflation Effect of Deglobalization

Since the outbreak of the major public health emergency in early 2020, the world economy started to run in paralleled deglobalization and inflation. On the one hand, the trend of globalization took a sharp turn around (Wang and Yang, 2022; Wang *et al.*, 2022), with international trade impacted, massive cross-border capital withdrawn, global supply chain system damaged, flow of people restricted, global labor force severely needed, and the manufacturing-centered goods trade value chain significantly lashed in production, processing, logistics, delivery and retail. To cope with the consequent uncertainties, government of the countries lifted some restrictive policies, but still kept in effect entry quarantine, delay in delivery of goods and other measures, which undermined the efficiency of cross-border economic activities and created global supply bottlenecks (Tan *et al.*, 2022). To ease the negative impact of blocked supply chain on local economic activities, the governments turned to seek domestic solutions in replacement of global supply chain, i.e. “renationalization” of global supply chain. Since February 2022, the geopolitical risks and the heavy economic sanctions posed by the U.S. and EU accelerated the economic decoupling across the countries, further accelerating the process of deglobalization. On the other hand, global high inflation already became an established fact. According to IMF statistics, CPI year-on-year growth in Q4 2022 reached 7.10% in the U.S. and 9.96% in the Eurozone. Meanwhile, some emerging economies similarly faced the fast-rising prices. In Turkey, for instance, CPI year-on-year growth in Q4 2022 amounted to 77.37%. Will deglobalization trigger the upward pressure of inflation?

5.1. “Inflation Effect” of Deglobalization

To calculate the cumulative effects of deglobalization on the current inflation, this paper refers to Freyaldenhoven *et al.* (2019) to construct the following Linear Panel Event-study Framework:¹

$$\pi_{i,t} = \underbrace{\sum_{m=-G}^M (\beta_m DG_{i,t-m} + \gamma_m C_{i,t-m})}_{\text{Whole-effect}} + \text{Control}_{i,t} \gamma + \alpha_i + \varepsilon_{i,t} \quad (4)$$

The subscript i and t refer to individuals and time respectively; explained variable π is inflation level, including CPI inflation rate and core inflation rate. $[-G, M]$ are factors driving the current upward inflation in 2020 Q1–2020 Q3 included in the whole effect *Whole-effect* apart from the control variable group. The paper decomposes them

¹ The “event study” here, different from the common event study in finance, is intended to use dynamic regression to avoid errors in estimator of traditional static two-way fixed effects (TWFE) (Goodman-Bacon, 2021).

into deglobalization shock DG and potential confound variable C . *Control* is control variable group, including inflation lag term, long-term inflation expectation, real economic growth, real money growth, real effective exchange rate index, international commodity price, and global economic status. α means individual fixed effect and ε error term. The sample observation starts in Q1 2011 and proceeds to Q3 2022 by a quarterly interval. Proxy variable Z is used to identify DG and C that cannot be directly observed:

$$\sum_{m=-G}^M \beta_m \widehat{DG}_{i,t-m} = \sum_{m=-G}^M \hat{\theta}_m Z_{i,t-m} \quad (5)$$

Z is the sum of standardized global supply chain pressure index and geopolitical risk. Parameter $\hat{\theta}$ is identified with the following equation:

$$\hat{\theta} = \arg \min_{\theta \in \mathbb{R}} \sum_i \sum_t \left[\mathbf{I}_{(M \geq t \geq -G)} \left(\text{Whole-effect} - \theta Z_{i,t} \right)^2 \right] \quad (6)$$

$\mathbf{I}(\cdot)$ means estimation interval. Based on the equation, the cumulative effects of deglobalization shock on inflation can be taken as the part in whole effect that can be explained with the proxy variable. According to the Formula (4) - (6), the calculation result is shown in Figure 5. With a series of control variables included and unobservable confounding factors considered, deglobalization has significant inflation effects. On average, deglobalization since 2020 results in a 1.75% increase of CPI inflation rate of the countries and a 1.69% increase of core inflation rate, both of which are significant at the 1% level.

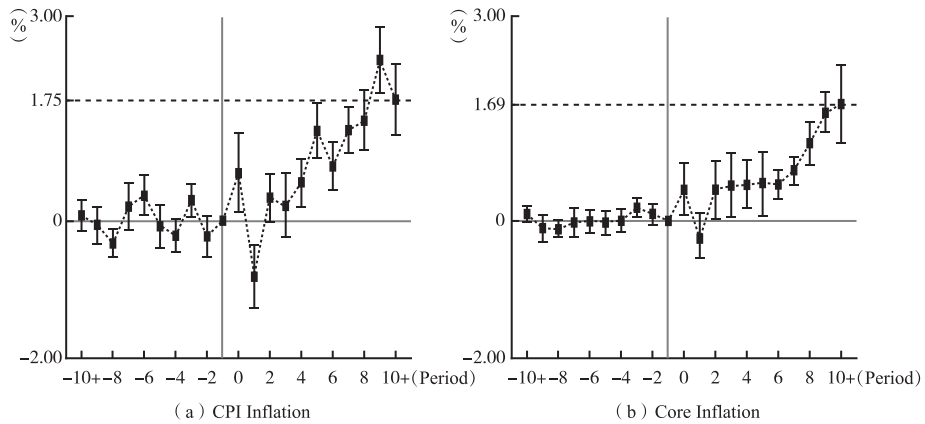


Figure 5. Cumulative Effects of Deglobalization on Inflation

Note: The paper sets the reference starting point of the shock to Q4 2019, making the time point 0 on the horizontal axis at Q1 2020. Cluster robust standard errors are adopted, with error bars being the 95% confidence interval.

Next, the paper applies Hamilton filtering to break down actual inflation into trend and cycle to evaluate the influence of deglobalization on the trend and cycle of inflation since the major public health emergency as shown in Figure 6. The calculation result indicates up to Q3 2022, cumulative effects of the deglobalization shock on CPI inflation trend and core inflation trend were 1.95% and 1.04% respectively, both being significant at the 1% level. It means as inflation of some economies kept climbing, the driving role of deglobalization for inflation of the countries (regions) has been manifested in the inflation trend. It's worth noticing that the underlying causes of deglobalization included import substitution of emerging economies and further centralized international trade, “technical backfire” effects of developed countries, and execution of super-easy monetary policies (Qu and Yang, 2022). Since the mid-and long-term structural factor of deglobalization is an important driver for the current inflation, the high inflation across the world may last for a long period and be harder to control than the expected in great uncertainties (Ji, 2022).

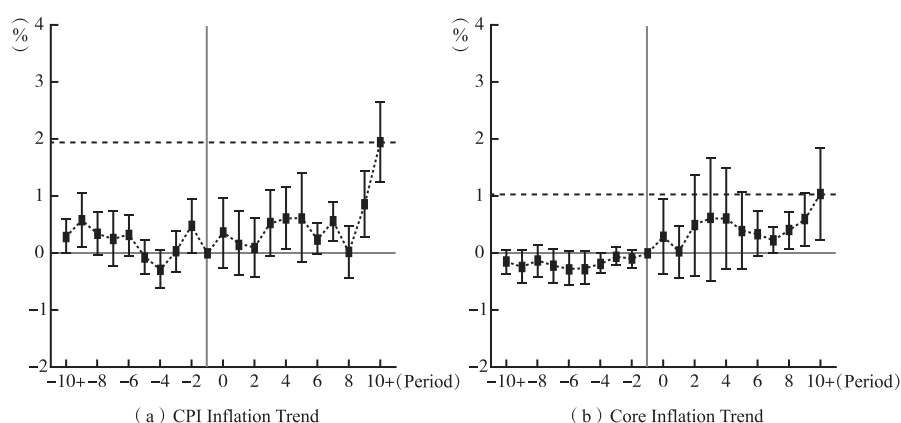


Figure 6. Cumulative Effects on Deglobalization on the Inflation Trend

5.2. Heterogeneity in the Effects of Deglobalization on Inflation

The geopolitical conflict in 2022 and a series of subsequent supply disruption sanctions became another deglobalization shock since the major public health emergency. In addition to the surging global geopolitical risks, multiple parties applied strict economic sanctions to Russia and sped up the economic decoupling. The paper refers to Wang and Li (2021) to construct a generalized difference-in-differences (GDID) model based on the exogenous shock of geopolitical conflict in 2022 and conducts heterogeneity analysis over the inflation effects of deglobalization. Specifically, the model is set as follows:

$$\pi_{i,t} = \alpha GVC_i^{RUS} \times Post_t + Controls_{i,t} \beta + \delta_i + \varphi_t + \varepsilon_{i,t} \quad (7)$$

The subscript i and t are individuals and time respectively; π is inflation level; GVC^{RUS} is Russia's value chain participation in the target country i .¹ $Post$ refers to dummy variable of shock, assigned value 1 for Q1 2022 and afterwards and 0 otherwise. The control variable group is defined in the same way as the Formula (4). δ is individual fixed effect and φ time fixed effect. To identify the effects of geopolitical conflicts, the paper narrows the event window and sets the starting point of the sample to Q1 2021 to eliminate the influence of the major public health emergency. If the coefficient of α is significantly positive, it signals under the shock of deglobalization, countries in deeper participation in global value chain suffer higher inflation levels.

The regression result is listed in Table 5. Coefficient of the interaction term is significantly positive. When individual fixed effect and time fixed effect are controlled simultaneously, its regression coefficient to CPI inflation and core inflation is 0.36 and 0.17 respectively, being significant at the 5% and 10% level. This means under the shock of deglobalization, when Russia's participation in the value chain of the target country improves by one unit of standard deviation, its CPI inflation will increase by 0.36% and core inflation by 0.17%.

Table 5. GDID Estimation Result

Variable	π^{cpi}		π^{core}	
	(1)	(2)	(3)	(4)
$GVC^{RUS} \times Post$	0.3050*** (0.1126)	0.3625** (0.1454)	0.1581** (0.0795)	0.1733* (0.0993)
Control variable	Yes	Yes	Yes	Yes
Individual control effect	No	Yes	No	Yes
Time control effect	Yes	Yes	Yes	Yes
R ²	0.9390	0.9274	0.9510	0.9152
adj. R ²	0.9221	0.9246	0.9118	0.9121

6. Conclusions and Policy Implications

Paralleled deglobalization and inflation are a highlighted feature of the world economy today. On the one hand, the pandemic of the major public health emergency and the surging geopolitical risks intensified the reversing of the globalization trend.

¹ In the context of trade integration, all the economies are subject to the shock of deglobalization to different extents and probably no “clean” treated group or control group exists. Therefore, under the traditional DID “0–1” classification, the identification result of the treatment effects will be more sensitive to the “subjective” grouping method.

On the other hand, global inflation level kept rising, making macro-policy control more difficult for the countries and increasing the risk of stagflation. In this context, this paper improves the traditional KOF index for globalization measurement, establishes a set of globalization indicators in trade, finance, flow of people, and information covering 163 economies, and includes them into the hybrid Phillips curve under open economic conditions to study the intrinsic ties between globalization (or deglobalization) and inflation. It finds globalization brings down the inflation level, and such effects weaken first before getting stronger in a nonlinear way. To further analyze the formation mechanism of such effects, the paper decomposes inflation into trend and cycle and segments the comprehensive globalization level. As to the trend, trade globalization measured with global value chain participation is the main driver for the downward inflation trend in developed economies, while globalization of information and finance is the primary driver for the downward trend in emerging and developing economies. With respect to the cycle, trade globalization makes inflation cycle of the countries (or regions) more sensitive to international commodities price and links the cycle of the countries through trade network. Since the outbreak of the major public health emergency in 2020, the reversing of globalization elevated the inflation hub and resulted in a 1.75% increase of CPI and 1.69% increase of core CPI for the countries. Those with deeper participation in global value chain experienced heavier upward pressure for inflation.

Despite the differences across the countries in the inflation trend, inflation cycle and their drivers, in general, globalization and inflation level are in significant negative correlation. From the perspective of open economy, inflation level of the countries is subject to the influence of economic globalization, international commodity price, global value chain, and spillover effects of inflation in other countries. Currently, the heated trend of deglobalization, the further aroused trade protectionism and the deteriorated international trade and investment environment have brought global economy the risk of stagflation and posed downward pressure for economy over the countries that had to adopt tight monetary policies to cope with inflation. Meanwhile, it means the cost and difficulty in coordinating monetary policies worldwide have both significantly risen.

References

- Ball, M. (2006). Has Globalization Changed Inflation. NBER Working Paper.
- Bernanke, B. (2020). The New Tools of Monetary Policy. *American Economic Review*, 110(4), 943–983.
- Bernanke, B., & Gertler, M. (2001). Should Central Banks Respond to Movements in

- Asset Prices. *American Economic Review*, 91(2), 253–257.
- Blanchard, O. (2016). The Phillips Curve: Back to the ‘60s’. *American Economic Review*, 106(5), 31–34.
- Blanchard, O. (2018). Should We Reject the Natural Rate Hypothesis. *Journal of Economic Perspectives*, 32(1), 97–120.
- Clark, T., & McCracken, M. (2006). The Predictive Content of the Output Gap for Inflation: Resolving in-sample and out-of-sample Evidence. *Journal of Money, Credit and Banking*, 38(5), 1127–1148.
- Coibion, O., & Gorodnichenko, Y. (2015). Is the Phillips Curve Alive and Well after All? Inflation Expectations and the Missing Disinflation. *American Economic Journal: Macroeconomics*, 7(1), 197–232.
- Dreher, A. (2006). Does Globalization Affect Growth? Evidence from a New Index of Globalization. *Applied Economics*, 38(10), 1091–1110.
- Eser, F., Karadi, P., Lane, P., Moretti, L., & Osbat, C. (2019). The Phillips Curve at the ECB. *Proceedings of the Money, Macroeconomics and Finance Research Group*, 88(S1), 50–85.
- Forbes, K. (2019a). Has Globalization Changed the Inflation Process. BIS Working Paper.
- Forbes, K. (2019b). Inflation Dynamics: Dead, Dormant, or Determined Abroad. NBER Working Paper.
- Freyaldenhoven, S., Hansen, C., & Shapiro, J. (2019). Pre-event Trends in the Panel Event-Study Design. *American Economic Review*, 109(9), 3307–3338.
- Goodman-Bacon, A. (2021). Difference-in-differences with Variation in Treatment Timing. *Journal of Econometrics*, 225(2), 254–277.
- Gordon, R. (2013). The Phillips Curve is Alive and Well: Inflation and the NAIRU During the Slow Recovery. NBER Working Paper.
- Gygli, S., Haelg, F., Potrafke, N., & Sturm, J. (2019). The KOF Globalisation Index-revisited. *Review of International Organizations*, 14, 543–574.
- Ha, J., Kose, M., & Ohnsorge, F. (2021). One-Stop Source: A Global Database of Inflation. CEPR Discussion Paper.
- Hamilton, J. (2018). Why You Should Never Use the Hodrick-Prescott Filter. *Review of Economics and Statistics*, 100(5), 831–843.
- Hazell, J., Herreño, J., Nakamura, E., & Steinsson, J. (2022). The Slope of the Phillips Curve: Evidence from U.S. States. *Quarterly Journal of Economics*, 137(3), 1299–1344.
- Huybens, E., & Smith, B. (1999). Inflation, Financial Markets and Long-run Real Activity. *Journal of Monetary Economics*, 43(2), 283–315.
- Ji, M. (2022). Vigilance against Global Inflation and the Rising Risk of Interest Rate Center. *China Finance (Zhongguo Jinrong)*, 22, 50–51.
- Kamber, G., & Wong, B. (2020). Global Factors and Trend Inflation. *Journal of*

- International Economics*, 122.
- Mishkin, F. (2009). Globalization, Macroeconomic Performance, and Monetary Policy. *Journal of Money, Credit and Banking*, 41(S1), 187–196.
- Orphanides, A., & Norden, S. (2005). The Reliability of Inflation Forecasts Based on Output Gap Estimates in Real Time. *Journal of Money, Credit and Banking*, 37(3), 583–601.
- Qu, S., & Yang, D. (2022). Manufacturing Localization, Technology Backfire and Economic Deglobalization. *China Industrial Economics (Zhongguo Gongye Jingji)*, 6, 42–60.
- Rudd, J., & Whelan, K. (2005). New Tests of the New-Keynesian Phillips Curve. *Journal of Monetary Economics*, 52(6), 1167–1181.
- Rudd, J., & Whelan, K. (2006). Can Rational Expectations Sticky-Price Models Explain Inflation Dynamics. *American Economic Review*, 96(1), 303–320.
- Stock, J., & Watson, M. (2010). Modeling Inflation After the Crisis. *NBER Working Paper*.
- Tan, X., Wang, X., & Zhang, B. (2022). Driving Factors of Global Commodity Price Cycle: An Empirical Analysis Based on Monthly Data from 2000 to 2021. *Journal of International Trade (Guoji Maoyi Wenti)*, 8, 1–18.
- Wang, S., & Yang, Z. (2022). Trade Centrality, Foreign Trade Dependence and Financial Risk-Financial Risk Prevention under the New Development Paradigm. *China Industrial Economics (Zhongguo Gongye Jingji)*, 8, 63–81.
- Wang, X., Zhou, Y., & Xiao, Y. (2022). Trade Effects of Geo-economic Factors: Evidence from Countries along the Belt and Road. *Economic Research Journal (Jingji Yanjiu)*, 09, 174–191.
- Wang, Y., & Li, N. (2021). Input Trade Liberalization and Factor Market Distortions. *China Industrial Economics (Zhongguo Gongye Jingji)*, 9, 43–61.