Financial Globalization, Output Gap and Foreign Output Gap on inflation: Evidenced from Developing Economies

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ABSTRACT

This paper covers previous studies' deficiencies and re-examine the theoretical model using a heterogeneous panel GMM technique, which overcomes cross-section dependency. In the current sample of developing nations, developed two models; model 1 consists of the domestic output gap, and the second model includes the foreign output gap. According to model 1, foreign globalization and imports boost the inflation level in developing countries and disaggregation analysis (low, lower-middle, and upper-middle-income countries). The output gap impedes inflation in overall, lower-middle, and upper-middle-income countries, while it boosts inflation in low-income nations. And unemployment level increases the inflation rate in the overall and middle-income groups, while in low- and high-income countries, it decreases. According to the second model, foreign globalization and the foreign output gap boost overall low-income, middle-income, and upper-middle-income groups. While import reduces the inflation level globally, while in low-income, middle-income, and upper-middle-income groups, it increases inflation. Finally, the unemployment level boosts the global inflation level and as well as in low income, and it impedes inflation rate in upper-middle-income group. Despite this, there is considerable variation in countries' effect, perhaps due to differences in political institutions' quality, central bank independence, exchange rate systems, financial development, and legal traditions.

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Introduction
Inflation expectations are considered the primary variable which provides information about forthcoming economic situations. Decades of discussion over the extent to which monetary policy is towards the future has not diminished (Eggertsson & Woodford, 2003; Friedman, 1968), but there is no doubt that policymakers paid extensive consideration to economic prospects. Simultaneously, the association between inflation and expected inflation is also essential for the monetary authorities and central banks. B. Bernanke (2007) emphasized the role of observed inflation and short-term inflation expectations, while inflation expectations strongly influence inflation. Past inflation is the primary tool for projected inflation, further simplifying inflation determined by two factors: local/national factors and international/global factors. Regional determinants include institutional considerations such as technological advances, changes in productivity levels, adoption of demographic indicators and inflation targets, and central banks' independence.

Globalization plays a vital role in stabilizing the developing countries' economic conditions, and it has a tremendous financial advantage to these nations. In the early 1980s, globalization is a significant discussion of determining inflation. Pain, Koske, and Sollie (2008); Pehnelt (2007) verified that globalization boosts inflation level while Ball (2006); Ihrig, Kamin, Lindner, and Marquez (2010) contradicts and found that globalization minimized inflation level because the in the presence of open economy international goods covers the demand of host country that create hurdles in increase the price level of goods. Globalization is the trade of goods and services, and finance is often promoted as an essential factor in international factors affecting global inflation rates. As a result, existing literature has argued that the country's inflation model is too concentrated (Auer, Borio, & Filardo, 2017; C. Borio, Filardo, & Auer, 2017; C. E. Borio & Filardo, 2007).

Furthermore, the globalization hypothesis (GH) explained that globalization (commodity and markets) mainly affects the domestic macroeconomic indicators like inflation and economic cycle by substituting the host indicators with the global indicators. This hypothesis has a growing concern among the monetary policymakers to handle inflation and interest rate. Globalization has significant effects on monetary policy performance by affecting the country's economic and financial environment. Monetary policy has little impact on the solid economic forces that cause this structural change age. But to create effective policies, the Federal Reserve must fully understand the factors that determine economic growth, employment, and inflation.

Initially C. E. Borio and Filardo (2007) inspected the outcome of globalization on the Phillips curve; they estimated the open economy Phillips curve and concluded that the global/foreign output gap significantly impacted inflation. While Ihrig et al. (2010) also supports the GH hypothesis and C. E. Borio and Filardo (2007) confirmed that positive linkage between the global output gap and inflation level and they also test the GH hypothesis in the presence of inflation expectations, Tootell (1998) examined strong evidence of the global output gap against the GH hypothesis for the Phillips curve, Gamber and Hung (2001); (Wynne & Kersting, 2007) also confirmed strong association for foreign resource utilization, While, Calza (2009) found week relationship. Galati and Melick (2006) include globalization in the determinants that change in inflation level and Milani (2010) argued that global output determined the domestic inflation by indirect aggregate demand of the host country. Further, they concluded that it could not be

1There is not enough room here to cover the details of the great literature dealing with various inflation determinants. (Greenspan, 2005) strengthened the role of technological progress, while Juselius and Takáts (2016) are good sources of demographic and inflation factors. (2018) are examples of studies exploring the link between quantitative relaxation and inflation.
included in the Phillips curve specification. Further, Nawatmi, Nusantara, Santosa, and Marlien (2020) confirmed that global output gap has significant indicator for domestic inflation while YOLCU KARADAM (2020) contradicts the results and concludes that domestic output gap has more significant effect on domestic inflation level rather than foreign output gap.

According to the theoretical Phillips curve model, the econometric model challenges handling inflation expectation, capacity control, and the output gap. It is difficult to estimate the output gap without perceptive the present capacity of the economy. The old globalization is not valid in the current case of the globalized, organized, and growing economy. It is difficult for a monetary policy without knowing the factors of globalization that affect the host economy. In the presence of political regimes, globalization's effect on the economy is a complex phenomenon, which has left researchers unable to grasp globalization's effect on inflation. So, the GH hypothesis successfully documented empirical facts of global inflation dynamics. The globalization hypothesis (GH) is limited in the case of two different aspects of inflation dynamics. Firstly, conventionally, there used short-term inflationary movements with the domestic output gap in the closed economy. In this esteem, GH's key denotation is that global economic recession has steadily substituted the domestic output gap by levitation the domestic inflation rate. At the same time, the second one is that the import price of advanced nations can lower the cost of established countries.

There are two significant ways by which the domestic and foreign output gaps determined the dynamics of inflation. Firstly, the incorporation of the global economy has no significant impact on the dynamics of inflation. On the other side, the domestic and foreign output may have considerable implications for inflation dynamics. For this purpose, this study used the panel data of developing nations to examine the comparative importance of both hypotheses: foreign output gap and domestic output gap on nations' inflation level. Moreover, both elements are linked with globalization but have independent effects instead of overlays.

This study examined the GH hypothesis on the Phillips curve expectations; furthermore, they measured both domestic and foreign output gaps to confirm globalization’s impact, as evidenced by (C. E. Borio & Filardo, 2007). The analysis reports two main questions. First, it is vital to understand whether globalization is essential for the dynamics of global inflation. This view is important from a political perspective and a theoretical perspective since the New Keynesian open Economics literature explicitly recognizes the external product gap’s role in determining internal inflation. The second exciting thing is to check whether the foreign inflation rate on the internal inflation rate has consistently changed over time with GH.

**Literature Review**

Inflation is an emotional problem Barro and Gordon (1983) presented the prominent monetary model, concluding that inflation is an economic problem. The short-run slope of Phillip's curve supports the central banks to regulate the dynamic inflation problem. They suggested that with the increase in inflation level, then output demanded increased. That is also verified by Romer (1993) by an open economy that significantly decreased the price level by real output growth. Wagner (2001) also supports the idea of globalization affects monetary policy. They further conclude two channels from which inflation affects monetary policy. Firstly, globalization motivates the globalization processes. Secondly, it affects the uncertainty of monetary policy. B. S. Bernanke (2005) explained that inflation theatres a significant role in the financial crisis, and globalization also affects inflation by importing the economy (Ball, 2006). According to IMF

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2 Steeper Phillip’s curve moves towards the expansionary policy so, central bank reduce the inflation level.
(2006), there is a negative affiliation among the trade openness and domestic output gap in non-oil importing nations.

Moreover, inflation affects the conclusion of a portfolio, the allocation of the money demand, and inflation, which increased the level of investment by reducing the lower rate of returns (Mundell, 1963; Tobin, 1965). Mankiw (1989) explained that the rise in inflation level seems to boom and deteriorating drifts in the recession period, which happened due to the absence of oil price shocks. Further, he established that financial expansion is the factor involved in long-run financial development and short-run financial uncertainty. Furthermore, Easterly and Bruno (1999) examined the affiliation among growth and inflation and concluded an inverse affiliation among economic expansion and inflation.

According to English (1999), the high inflation rate forces households to find substitutes for purchasing transition facilities for money stabilities. Which enhanced the level of financial segment results increased the size and volume of the financial sector. Results indicate an optimistic association between financial division and inflation that contradicts (Haslag & Koo, 1999) suggests an inverse affiliation between economic expansion and threshold inflation. Further, it has an inverse relationship between inflation and economic development, which Rousseau and Wachtel (2001) verified and further discussed that inflation decreases financial growth directly and indirectly. They also mentioned that when inflation is at a moderate level, its direct effect has almost vanished, and its indirect impact is incapable of covering economic evolution, which is also confirmed by (Boyd, Levine, & Smith, 2001), inflation increasing effects on financial expansion after the threshold level after the threshold level inflation hurts the financial growth (Khan, Qayyum, & Ghani, 2006).

Hence an increase in the inflation level caused the financial system and damaged the financial market or disturbed the financial market (Liddle & Smith, 2003). In the presence of high inflation, bank crisis risk is also increasing due to high inflation level breaks down financial expansion to work, which affects the economic growth in the short-run Boyd and Champ (2003) examined that in the short run, inflation boosts the financial expansion but in the long run, its create hurdles in the financial development. Wahid, Shahbaz, and Azim (2011) also support that inflation and financial expansion have long term relationships, and inflation retards financial growth.

Meanwhile, Satti, Shahbaz, Mujahid, and Ali (2013) studied the impact of globalization on inflation in the presence of foreign remittances and economic growth. They conclude that financial development and foreign remittances boost inflation, while globalization and economic growth stimulate inflation. Furthermore, they suggested that the financial sector needs to be improved to control the inflation rate. Political interference should be minimized, like loans and financial credits by political interference to white elephants (uncreative public sector) would be excluded. Monetary authorities should issue financial credits to productive and real sectors of the economy and control the money supply. Moreover, economic development also is used to control inflation. Globalization boosts the inflation level, so the government needs to improve its trade policies to real optimal trade and globalization fruits.

Like Allard (2007a) investigated the factors of inflation in the presence of globalization. She found that globalization has an influential and significant role in determining the domestic inflation level and concludes that globalization reduced inflation. If the output level is greater than the globalization level, it has a considerable consequence on inflation and vice versa. Moreover, Ciccarelli and Mojon (2010) explained that inflation is a worldwide channel. Further,

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3 Central East European countries has high output level.
they originated that inconsistency in national inflation depends on the OECD associate country's inflation. Furthermore, C. E. Borio and Filardo (2007) examined the elucidation of the nationwide inflation's influence. They also achieved that globalization has an imperative role in defining inflation in open nations.

According to Zaman, Ikram, and Ahmed (2010) examined the connection between economic development, financial expansion, and inflation in Pakistan's case. Results indicated that money supply positively affects economic evolution and inflation; a causal relationship exists among financial expansion and inflation. This contradicts by Bittencourt (2011) by inflation has impeded financial development and further explained that macroeconomic presentation has an inverse effect on financial growth and increases income inequality that reduces growth. Furthermore, Aboutorabi (2012) constructed the multidimensional index for financial expansion to inspect the connection between inflation and financial accumulation. Results indicated that inflation declines the performance of financial markets and reduced financial progress. Which is further confirmed bidirectional relationship between inflation and financial development (Odhiambo, 2012) that concludes that inflation decreased the level of financial development.

The study's central question is that globalization affects inflation level or not, studied by Ihrig et al. (2010). It concludes that the domestic output gap, trade prices, and import prices have not significant inflation but support flatter Phillip's curve. They also accomplish that the foreign output gap significantly affects inflation, and globalization does not cause domestic inflation, which contradicts (Mumtaz & Surico, 2012), which shows that globalization has a significant role in the domestic inflation level.

Moreover, (Chang & Tsai, 2015) empirically inspected globalization's influence on the panel of 21 OECD states' inflation level for 1970 to 2010. Furthermore, they wanted to examine the causal relationship among globalization and inflation. For this purpose, they used the panel causality analysis. Results conclude that globalization's negative effect on inflation level and found causal relationship exists except for Hungary and Poland because a one-way causal relationship exists from inflation to globalization.

Furthermore, the globalization hypothesis for domestic inflation was also examined by (Bianchi & Civelli, 2015); they used globalization's foreign output gap. They performed panel and time series analysis in this study from 1970 to 2006. And concluded that global economic fluctuations significantly affect the domestic inflation level, which means that foreign output has a significant positive effect on domestic inflation. Secondly, the domestic output gap has a more substantial impact on inflation dynamics than foreign output. Lastly, while the time series analysis does not found the considerable effect of globalization, they concluded that globalization's impact needs significantly large variations in the degree of openness in directive to be economically significant.

Recently (Mazumder, 2017) examined the impression of globalization on inflation for 146 emerging nations; furthermore, they concluded both tractional and open economy Phillips curve models in the presence of national and foreign output gaps for the time period of 1970 2009. Results conclude mixed effects of globalization on inflation, like globalization, have a significant impact on inflation while inflation is proxied by GDP deflator, and while the consumer price index measures inflation, globalization has no significant effect. This analysis shows close intention towards the measurement of inflation implemented, which is what past literature neglects.

These are some latest studies in which they studied the impact of globalization on ASEAN inflation level and proved the global hypothesis which is globalization reduced domestic factor
while it increased the global factor to determined inflation level. Because they found that the domestic output gap does effect ASEAN inflation level while global output gap increased domestic inflation level (Nawatmi et al., 2020). While YOLCU KARADAM (2020) contradicts that because they examined globalization hypothesis for 26 industrial countries from 1985 to 2017 and concluded the alter results. They found that domestic output gap rather than foreign output gap played significant role on dynamics of inflation. Moreover, import prices are significant impact to domestic inflation level.

According to the previous literature, most of the studies examined the domestic Globalization hypothesis. This study concludes the GH hypothesis in the presence of domestic and foreign globalization and the output gap, which is unique from the rest of the studies for the panel of available data. This perspective is theoretically impressive, but it is empirically unique because the New Keynesian hypothesis also recognized the foreign output gap's role in determining the domestic inflation level.

The rest of the paper is in section 3. We deliberate both the theoretical and empirical model of the new Keynesian Philips curve and inferences of the Globalization Hypothesis for inflation in the Phillips Curve model framework. In section 4 empirically estimate the model, and section 5 has the conclusion of the study.

**Theoretical Framework**

According to Galí and Gertler (1999), the New Phillips Curve Model (NPCM) is given as

\[ \Delta p_t = \alpha_1 \Delta p_{t+1} + \alpha_2 \text{wageshare}_t + \alpha_3 \Delta \text{importprices}_t + \mu_t \]  

According to equation 1, Inflation depends on expected inflation, output gap/ wage share, and import prices. According to the Philips curve, there is a short-run relationship between inflation and unemployment. There is no relationship in the long run because inflation is determined by money growth and unemployment equals its natural rate. To fill this gap by rational expectation terms of inflation. The expectation term \( \Delta p_{t+1} \) is assumed to obey rational expectations.

The New Keynesian Phillips curve (NPCM) model is a more generalized model due to its forward-looking expectations, which relate inflation to the marginal cost of optimizing firms that set their prices. The labour supply optimization condition allows using the marginal cost of the consumer and production function's output gap to derive the Philips curve representation.

The specific form of the NCPM model in case of an open economy deals with the local currency pricing model, biasness consumption, and risk-sharing according to the following equation;

\[ \pi_t = \sigma E_t \pi_{t+1} + \tau [(1-w)\gamma_t^d + h\gamma_t^f] + \omega_t \]  

Model-based on the heterogeneous labour markets encountered a change in price and currency level (Steinsson, 2008; Zaniboni, 2008). Hence the inflation depends on both domestic and foreign output gaps. Home-based consumption is estimated by (1-h), and \( \tau \) estimated the responsiveness change in inflation due to domestic and foreign output gap. While due to domestic consumption creates the home biasness, then the domestic output gap coefficient is greater than the foreign output gap. However, the foreign output gap indirectly affects the host inflation rate due to the structural effects not captured by the reduced form model. Hence, the foreign output gap significantly impacts the host domestic output gap and inflation behaviour, estimated by \( \Gamma \) term. Moreover, openness relates to the foreign output gap in determining domestic output, and openness should minimize these two output gaps' marginal costs.

**Empirical considerations**

In particular, in the NPCM model, the globalization hypothesis applied three specifications to the NPCM open economy model, which is given

\[ \pi_t = E_t \pi_{t+1} + \alpha \gamma_t^d + \phi \gamma_t^f + \omega \pi_t^m \]  

According to the above equation, inflation depends on the expected inflation level, the domestic
output gap, and the foreign output gap and import price inflation. Specification of the GH on NPCM are:

1. The domestic output gap is less significant in the presence of globalization in both open and closed economies.
2. The foreign output gap is replaced by the domestic output gap in the presence of globalization.
3. Import prices inflation must be increased when globalization is more intense.

According to Zaniboni (2008), the foreign output gap has a minor role in the degree's function for realistic openness ranges. So, it is possible to find stimulating responses of inflation to a foreign output. In the past, globalization is a problem because it is a complex phenomenon, but now it's not difficult to measure globalization; their index is available. This paper examines the influence of the national and foreign output gap on inflation in the open economy model with financial globalization. According to the previous studies, trade openness is the proxy of globalization, knowing the GH hypothesis's linkage with inflation. Secondly, the theoretical models for the open economy Phillips curve and trade openness boost the foreign output gap's significance on the domestic inflation rate.

**Our approach**

Simplify the NPCM open economy model within the presence of financial globalization, output gap, foreign output gap, and import price index. The functional form of the model become:

Inflation = f (expected inflation, financial globalization, output gap, import prices, unemployment, trade) 

(4)

While in the case of the open economy, firms discriminate against the domestic and foreign markets’ prices by exporting goods and services to foreign countries (Clarida, Galí, & Gertler, 2002; Corsetti & Pesenti, 2005). So it creates the dependency of host country inflation based on foreign country marginal cost output gap while Gali and Monacelli (2008); Monacelli (2005) modified the model from small economy to open economy by using foreign output gap 

Inflation = f (expected inflation, financial globalization, foreign output gap, import prices, unemployment, trade)  

(5)

**Data Description**

| Variables | Description                  | Measurement                      | Source                                           |
|-----------|------------------------------|----------------------------------|-------------------------------------------------|
| INF       | Consumer prices              | (Annual %)                       | WDI                                             |
| FGLOB     | Foreign direct investment    | “Sum of stocks of assets and liabilities of foreign direct investments (% of GDP)”. | Lane and Milesi-Ferretti (2018) and IMF IIP (2019b) |
|           | Portfolio investment         | “Sum of stocks of assets and liabilities of international equity portfolio investments (% of GDP).” | Lane and Milesi-Ferretti (2018) and IMF IIP (2019b) |
|           | International debt           | Sum of inward and outward stocks of international portfolio debt securities and international bank loans and deposits (% of GDP). | World Bank WDI (2019) |
|           | International reserves       | Includes foreign exchange (excluding gold), SDR holdings, and reserve position in the IMF (% of GDP). |                                                 |
Econometrics model

Dynamic panel Generalized Method of Movements

This study used panel data to examine the impact of financial globalization, output gap, and foreign output gap on inflation. According to Phillips, inflation is significantly dependent on the past too. It might be creating the problem of endogeneity, and results will not be biased.

So, Arellano and Bond (1991) explained that difference GMM estimates minimized the problems of endogeneity and the problem of autocorrelation in the equation and results, are unbiased and efficient. Furthermore, they explained that the data's transformation solved the fixed effect and the lagged values of variables to resolve endogeneity in the equation. Later, Blundell and Bond (1998) articulated that difference GMM is not efficient in the small T and lagged instruments case because instruments are not valid in the first difference case and when the variables are close to a random walk and due to small T variables are highly persistent (Alonso-Borrego & Arellano, 1999). On the other hand, according to the Arellano and Bover (1995); Blundell and Bond (1998) system, GMM resolved dynamic problem biasness and endogeneity in the model. System GMM is more efficient in the first difference case because instruments are not correlated with the fixed effect (Roodman, 2009). In our case we have sufficient number of T so the dynamic panel GMM results will be efficient because GMM efficiently minimized the problem of endogeneity and autocorrelation (Arellano & Bover, 1995; Blundell & Bond, 1998, 2000). And the System GMM equation is;

\[ \text{INF}_t = \theta_1 \text{INF}_{t-1} + \theta_2 \text{X}_t + \rho_t + \theta_t + \varepsilon_{it} \]  
\[ \text{INF} \text{ is inflation, which is measured as consumer price index to measure the inflation level, } \theta_1 \text{ measures the effect of past inflation level on current inflation level, } \text{X} \text{ represents all controlled indicators such as financial globalization, output gap, foreign output gap, import prices, and unemployment level and } \theta_2 \text{ are the elasticities of the controlled variables, } \rho_t \text{ is the cross-section effect and } \theta_t \text{ is the time effect and } \varepsilon_{it} \text{ is the error term of the regression.} \]

The first of the estimation is to estimate the first difference transformation to minimize the cross-section effect from the regression, which the following equation can eliminate;

\[ \Delta \text{INF}_{it} = \theta_1 \Delta \text{INF}_{it-1} + \theta_2 \Delta \text{X}_t + \Delta \theta_t + \Delta \varepsilon_{it} \]  
\[ \text{For } i = 1, \ldots, \ldots, N \text{ and } t = 3, \ldots, T. \]

And further, it is assumed that residuals are uncorrelated, i.e.;

\[ E(\varepsilon_{id}, \varepsilon_{if}) = 0 \text{ for } d \neq f \]  
\[ E(\text{INF}_t \varepsilon_{it}) = 0 \text{ for } t \geq 2 \]

This is the initial restriction for INF as a predetermined.

Furthermore, the dynamic GMM equation model will become

\[ \text{INF} = \beta_{0,lt} + \beta_{1,lt} \text{INF}_{t+1} + \beta_{3,lt} F\text{GLOBAL} + \beta_{4,lt} O\text{UTPUTGAP} + \beta_{5,lt} \text{PB} + \beta_{6,lt} \text{UNEM} + \mu_{lt} \ldots \]  
\[ (10) \]

While in case of open economy used the foreign output gap instead of the domestic output gap, then the econometric model will be
\[ \text{INF} = \gamma_{0,lt} + \gamma_{1,lt} \text{INF}_{t+1} + \gamma_{3,lt} \text{FGLOB} + \gamma_{4,lt} \text{OUTPUTGAP} + \gamma_{5,lt} \text{PB} + \gamma_{6,lt} \text{UNEMP} + \mu_{lt} \]  

(11)

Results and Discussion

Descriptive statistics of discussed models are given in table 1,

| Variable   | Obs. | Mean  | Std.  | Min  | Max   |
|------------|------|-------|-------|------|-------|
| INF        | 1,949| 12.606| 96.118| 0.013| 4145.106 |
| FGLOB      | 1,980| 51.398| 16.084| 12.163| 98.922  |
| IMPORT     | 1,968| 281.696| 219.145| 25.404| 1480.230 |
| UNEMP      | 1,980| 7.972 | 6.038 | 0.285 | 33.473  |
| OUTPUTGAP  | 1,980| 10.959| 1.734 | 6.366 | 16.399  |
| GOUTPUTGAP | 1,980| 804.288| 386.514| 0.000 | 2725.483 |

According to model 1, results of dynamic panel GMM for 90 developing economies, low-income economies, low middle-income economies, and upper-middle-income economies are given in table 3:

| Model 1 Models | All countries | Low income | Low Middle Income | Upper Middle Income |
|----------------|---------------|------------|-------------------|---------------------|
| Dependent Variable: INF | Coef. | Coef. | Coef. | Coef. |
| Variables | 12.079** | -25.264* | -2.670 | 3.281 |
| C | (4.887) | (14.234) | (8.925) | (5.789) |
| | [0.013] | [0.076] | [0.765] | [0.571] |
| | 0.029** | 0.799*** | 0.750*** | 0.785*** |
| | (0.001) | (0.023) | (0.007) | (0.003) |
| | [0.000] | [0.000] | [0.000] | [0.000] |
| | -0.307*** | 0.077*** |
| | (0.014) | (0.015) |
| | [0.000] | [0.000] |
| | 0.065*** |
| | [0.003] | [0.000] |
| | FGLOB | 0.184*** | 0.067** | 0.291*** |
| | (0.031) | (0.032) | (0.053) | (0.054) |
| | [0.000] | [0.001] | [0.001] | [0.000] |
| | -1.062* | 2.349** | -1.088* | -1.915*** |
| | (0.413) | (1.150) | (0.676) | (0.488) |
| | [0.010] | [0.041] | [0.108] | [0.000] |
| | 0.024*** | 0.004** | 0.008*** | 0.010*** |
| | (0.002) | (0.002) | (0.001) | (0.002) |
| | [0.000] | [0.000] | [0.000] | [0.000] |
| | 0.495** | -0.012 | 0.805** | -0.262** |
| | (0.158) | (0.849) | (0.287) | (0.110) |
| | [0.002] | [0.989] | [0.005] | [0.017] |

Model Diagnostics

| AR1 | 0.731 | 0.000 | 0.159 | 0.194 |
| AR2 | 0.147 | 0.074 | 0.245 | 0.312 |
| Sargan | 0.008 | 0.481 | 0.098 | 0.054 |
| Prob > chi2 | 0.000 | 0.000 | 0.000 | 0.000 |

Note: Standard error are written in () and prob. value is written in [ ] parenthesis and ***, ** and * show 1%, 5% and 10% level of significance respectively.

According to the table, equation 1 includes the output gap instead of the global output gap,
estimated by dynamic panel GMM for 90 developing countries, and performs the disaggregated analysis on income-based. According to the World Bank ranking, there are three income groups: the first one is a low-income group, the second is the lower-middle-income group, and the third is the upper-middle-income group.

First, discuss the primary model, consisting of 90 developing countries, financial globalization, import prices, and positive unemployment effects on inflation level and output gap adverse effects inflation level.

Results confirmed that globalization (measured by financial globalization) boosts inflation (Bianchi & Civelli, 2015; Satti et al., 2013). Globalization makes the Phillips curve steeper that results in a rise in inflation level and more quantality demanded. Wagner (2001) introduced globalization for monetary policy, and he explained two ways for inflation and monetary policy. Firstly, global competition boosts the globalization process.

Further, it affects the uncertainty in monetary policy. Further Mumtaz and Surico (2012) confirmed that globalization is vital in determining the domestic inflation level. Moreover Allard (2007b) also verified that globalization determined the domestic inflation level and concluded that if the output level is significant, globalization has a strong effect on inflation and vice versa. The output gap is the difference between the actual and potential output levels, which shows its economic situation. Results confirmed that the output gap reduced the level of inflation. And the negative output gap represented the low level of inflation and caused an increase in the unemployment level. Easterly and Bruno (1999) investigated the inverse association between economic growth and inflation level due to the aggregate supply curve rightwards shifts that caused the decline in the inflation rate. Hence there is a negative relationship between economic growth and inflation. According to the Friedman-Ball hypothesis and (Brunner 1993), the due uncertain monetary reaction caused the decline in the output growth and ultimately caused the inflation uncertainty. Some argued that real growth caused a decrease in inflation and inflation uncertainty (Pourgerami & Maskus, 1987; Ungar & Zilberfarb, 1993).

Import price has a statistically significant and optimistic effect on inflation, and it means that the rise in import prices leads to boosting the developing nation's inflation rate. Generally, crude oil prices significantly affect petroleum products, ultimately increasing electricity prices, causing inflation from a consumer point. And according to the production side, that leads to boosts in the per-unit cost of production that results from an increase in the inflation level (Lescaroux & Mignon, 2008). And this procedure is also supported by (Malik, 2016).

According to the Phillips curve, there is an inverse affiliation among the inflation and unemployment level and discussed a positive relationship among them in hyperinflation, which means the increase in inflation level increased in the unemployment level and vice versa. But according to the results of developing countries, unemployment increase the inflation level, which shows a positive relationship between them. So, results confirmed that there exists a hyperinflation situation in the developing countries.

In a disaggregated analysis, financial globalization and import prices boost inflation, similar to the main model results. The low-income developing group output gap increases the inflation level, following the demand-pull inflation and cost-push inflation theories. According to the demand-pull inflation case, the aggregate demand of the economy, which takes over the aggregate demand over the aggregate supply that caused the increase in the inflation rate with the increase in the gross domestic product and fall unemployment level, the economy moves along the Phillips curve hypothesis. Furthermore, it concluded that too much money spends on a few goods, which caused inflation (Barth & Bennett, 1975). Other the other hand, cost-push inflation
also caused inflation in the economy by an increase in the price of a factor of production that decrease the supply of goods in the market, while the demand for the goods remains constant that caused the increase in the prices of good in the market and caused in the inflation in the economy. While in a lower-middle and upper-middle-income group, output gaps reduce the inflation level, which is similar in the primary model.

In the low-income group, the unemployment rate negatively affects the inflation level, while in the lower-middle-income group, it boosts the inflation level, similar to the primary model. Simultaneously, the upper-middle-income group follows the Phillips curve premise, which is the trade-off between inflation and unemployment. Hence the results confirmed that the low and upper-middle-income group follows that Phillips curve hypothesis.

According to model diagnostics, the AR test indicates that there does not exist the autocorrelation problem in the model. In contrast, the Sargan test demonstrates that the models’ instruments are valid, which can handle the problem endogeneity and chi-square probability indicates the model is accurate.

Table 4: Results of GMM for developing countries with income groups

| Model 2 Models | All countries | Low income | Low Middle Income | Upper Middle Income |
|----------------|---------------|------------|------------------|---------------------|
| Dependent Variable: INF | Coef. | Coef. | Coef. | Coef. |
| Variables | Coef. | Coef. | Coef. | Coef. |
| C | -11.496*** | -8.186* | -18.740*** | -11.352*** |
| | (2.047) | (4.588) | (2.146) | (2.758) |
| | [0.000] | [0.074] | [0.000] | [0.000] |
| | 0.027*** | 0.790*** | 0.727*** | 0.785*** |
| | (0.000) | (0.023) | (0.006) | (0.004) |
| | [0.000] | [0.000] | [0.000] | [0.000] |
| | -0.290*** | | | |
| L2.INF | | | | |
| | | | | |
| | | | | |
| | | | | |
| L3.INF | 0.129*** | 0.077** | 0.124** | 0.265*** |
| | (0.024) | (0.033) | (0.051) | (0.052) |
| | [0.000] | [0.021] | [0.014] | [0.000] |
| | | | | |
| FGLOB | | | | |
| | | | | |
| | | | | |
| | | | | |
| OUTPUTGAP | 0.019*** | 0.005** | 0.012*** | 0.002* |
| | (0.001) | (0.001) | (0.002) | (0.001) |
| | [0.000] | [0.000] | [0.000] | [0.103] |
| | -0.028*** | 0.006** | 0.02 | 0.001 |
| | (0.003) | (0.003) | (0.002) | (0.002) |
| | [0.000] | [0.034] | [0.166] | [0.689] |
| | 0.636*** | 0.210 | 0.720*** | -0.401*** |
| | (0.163) | (0.753) | (0.196) | (0.114) |
| | [0.000] | [0.780] | [0.000] | [0.000] |
| Model Diagnostics | | | | |
| AR1 | 0.762 | 0.000 | 0.164 | 0.146 |
| AR2 | 0.176 | 0.096 | 0.246 | 0.259 |
| Sargan | 0.007 | 0.416 | 0.101 | 0.098 |
| Prob. > chi2 | 0.000 | 0.000 | 0.000 | 0.000 |

Note: Standard error are written in () and prob. value is written in [ ] parenthesis and ***,** and * show 1%, 5% and 10% level of significance respectively.
According to the table, model 2 used the global output gap instead of the output gap to compare inflation, whether the global output gap significantly impacted inflation or the output gap in developing countries. Financial globalization positively affects the inflation level (Allard, 2007a; Bianchi & Civelli, 2015; Mumtaz & Surico, 2012; Satti et al., 2013; Wagner, 2001) in section 3. The global output gap boosts the inflation level in all developing states and low-income, lower-middle-income, and upper-middle-income groups (Barth & Bennett, 1975). We used the global output gap instead of the output gap to check whether the impact of the global output gap on inflation is more than the domestic output. According to tables, 3 and 4 coefficient of the global output gap is positive. At the same time, the domestic output gap has adverse effects on inflation in all selected developing countries. So, in that case, the global output gap boosts the inflation rate in emerging nations. Hence, it follows the theoretical GH hypothesis, globalization of commodity and financial markets shifting the elements of national macroeconomic outcomes such as inflation rate and economic cycle. It also follows in the case of lower-middle-income groups and upper-middle-income group. In the case of low-income countries, the output gap has positive effects on the inflation rate with a higher coefficient's value compared to the global output gap, which means that in low-income countries where the purchasing power of people is already below so the domestic output gap more appropriate for the inflation rate rather than the global.

Overall, developing countries import prices harm inflation levels; meanwhile, in low income, lower-middle (has statistically insignificant) and upper middle income (has statistically insignificant) countries boost inflation level (Lescaroux & Mignon, 2008; Malik, 2016). The unemployment rate has positive effects on the inflation level, which means an increase in inflation, with an increase in the unemployment rate in the hyperinflation rate in the overall, low-income, and lower-middle-income countries. In contrast, upper-middle countries follow the Phillips curve theory, which shows an inverse relationship between inflation and unemployment. So in low-income and lower-middle-income countries, there is a positive relationship between inflation and unemployment level, while in the upper-middle-income group, the Phillips curve hypothesis exists.

According to model diagnostics, the AR test indicates there is no autocorrelation problem in the model, and the Sargan test indicates that the instruments used are valid, and the Chi-square value indicates the model is a good fit, so overall concludes that the model is a good fit.

**Conclusion**

The study's objective is to analyze the impression of the output gap and financial globalization on inflation. And we also want to differentiate between the impact of the output gap and the global output gap on the inflation level, so we used the panel of 90 countries. Results indicate that financial globalization, import prices, and positive unemployment effects on inflation and output gaps negatively affect inflation. Globalization makes the Phillips curve steeper; as inflation climbs, more output is demanded. Import price increases inflation; unemployment increases the inflation level, which shows a positive relationship between them.

While in the case of disaggregated analysis, financial globalization and import prices boost the inflation level, the output gap has a positive effect on inflation in the case of low income developing economies like according to demand-pull inflation, Unemployment rate, confirmed Phillip's curve hypothesis in low income and upper middle income developing countries, while has positive in lower middle income developing countries and Financial globalization positive effects inflation level (Allard, 2007a; Bianchi & Civelli, 2015; Mumtaz & Surico, 2012; Satti et al., 2013; Wagner, 2001).
The global output gap boosts the inflation level in all developing countries and low-income, lower-middle-income, and upper-middle-income groups [Barth, J. R., and Bennett, J. T. (1975)]. The global output gap is positive, and the domestic output gap has adverse effects on inflation in all selected developing countries, so in that case, the global output gap boosts the inflation rate in developing countries. Hence, it follows the theoretical GH hypothesis, globalization of commodity and financial markets changing the determinants of national macroeconomic outcomes such as inflation and economic cycles. It also follows in the case of lower-middle-income groups and upper-middle-income group. In low-income countries, the output gap has a positive effect inflation rate with a higher coefficient value than the global output gap, so the domestic output gap is more effective than the inflation rate rather than the global.

Therefore, we see evidence that financial globalization as a variable for the Phillips curve model is not rejected for most countries in our developing countries sample. This non-linear component must be explicitly shaped and included in the globalization hypothesis. As countries reach a certain level of openness, their internal inflation begins to respond to external influences, such as capturing products' external gap. At the same time, economies are relatively closed and do not reach adequate levels of openness. Accounting for the Phillips curve irregularities reveals new evidence that, against previous literature, ignores these effects to corroborate the hypothesis of globalization of inflation. Our approach is vital for many alternative specifications and provides an adequate tool to guide the policy-making process on the impact of relevant external forces.

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