

Inflation, Monetary Policy and Globalization Nexus: A Panel data analysis

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Abstract

Inflation, as major macroeconomic variable has always been an important area of research for socio-economic policy makers. For prudent policy formulation it is of vital importance to investigate the possible dimensions, through which it is generated. The aim of present study is to measure the impact of monetary policy and globalization on South and South East Asian inflation by utilizing the time span from 1981-2016. To examine the nature of globalization-inflation relationship the study utilized an updated measure of globalization. Moreover, the current study measures the impact of monetary policy variables on inflation, ignoring random shocks as these considered fewer fractions for the inconsistency of the policy instruments. The study also employed Hodrick Prescott filter to calculate the domestic output gap in order to assess that still changes in domestic output gap are relevant to inflation variation in the presence of globalization, hence to refute the observation of flat Phillips curve that suggests the insignificant role of domestic output gap in the era of open economy. Estimating augmented Phillips curve model and employing structural modeling Panel data Mean Group (MG) and Pooled Mean Group (PMG) Estimation technique, the results of the study confirm that both global and domestic factors have significant and descriptive power for domestic inflation. Therefore, the monetary authorities of these countries should consider the developments in global conditions.

Keywords: Globalization, Inflation, Monetary policy, Output gap Panel Unit Root Test

Introduction

The closing decades of the 20th century witnessed the emergence of an integrated system of economics, politics and culture due to the revolutionary developments introduced in the fields of transportation and information technology. This development gave birth to a new phenomena namely globalization which received a new impetus in the form of internet revolution and better transportation. Furthermore, a considerable decline in the cost of communication and transportation apart from increasing the interaction among the various cultures of the world actualized the very notion of global market.

The impact of liberalization and monetary policy on inflation has been witnessed as one of the most unsettled issues in the world economy for the last two decades. The aim of this study is to investigate the role of globalization as a major factor in driving the radical changes in monetary policy. In other words, it explores the changing pattern of inflation and monetary policy within Asian countries as they liberalized their economies and became a part of integrated global village. The major purpose of country's monetary policy is to acquire certain desired objectives of growth and inflation which the government sets annually. Therefore, the central bank of every economy formulates the monetary policy in accordance with these developed targets. Besides discussing other factors regarding objectives of central bank, the primary objective of the monetary policy is to minimize the volatility in prices. Price stability is a tool through which monetary policy by attaining such objectives as stability in growth, reduction in poverty and unemployment, etc. aims at the wellbeing of common people. On the contrary, price instability in any country results in over investment in the financial sector, inappropriate production decisions, higher taxation and misuse of capital. Price sta-

bility, therefore, is considered a major prerequisite for any economy to attain and sustain long-term stable economic growth.

Table 1: Average Inflation (Annual Percentage)

| | 1981-85 | 1986-90 | 1991-95 | 1996-20 | 2001-05 | 2006-10 | 2011-15 |
|-------------|----------|----------|----------|----------|----------|----------|----------|
| Bangladesh | 9.366 | 7.541932 | 5.723562 | 4.879984 | 5.12852 | 7.664868 | 7.527681 |
| Bhutan | 9.354291 | 9.036447 | 11.19124 | 7.333658 | -1.06743 | 5.976246 | 7.900713 |
| India | 9.349675 | 7.829614 | 10.4913 | 7.6103 | 3.979293 | 8.747405 | 8.126882 |
| Indonesia | 9.739607 | 7.475238 | 8.916041 | 19.35892 | 9.332409 | 7.847946 | 5.761689 |
| Korea, Rep. | 7.343705 | 5.44467 | 6.217701 | 3.991832 | 3.337698 | 3.029272 | 1.899241 |
| Malaysia | 4.693373 | 1.802906 | 3.967539 | 3.140144 | 1.739376 | 2.674143 | 2.440115 |
| Nepal | 9.223814 | 11.16377 | 11.23693 | 6.880971 | 4.220571 | 8.589258 | 8.801093 |
| Pakistan | 7.169496 | 6.784393 | 11.19715 | 7.297321 | 5.172139 | 12.66696 | 7.804503 |
| Philippines | 21.35515 | 8.699663 | 10.36945 | 6.443494 | 4.340699 | 4.930909 | 3.27105 |
| Singapore | 3.275166 | 1.2934 | 2.559748 | 0.89952 | 0.640252 | 2.607654 | 2.534032 |
| Thailand | 4.989048 | 3.878066 | 4.805424 | 4.260465 | 2.285617 | 2.949875 | 2.002101 |

Source: Based on data from world development indicators(WDI).

The trend of inflation in the countries under consideration can easily be observed as fluctuating over the last 36 years. However the trend is declining over the recent years due to an integrated environment, low international market prices and improved supply of goods and services.

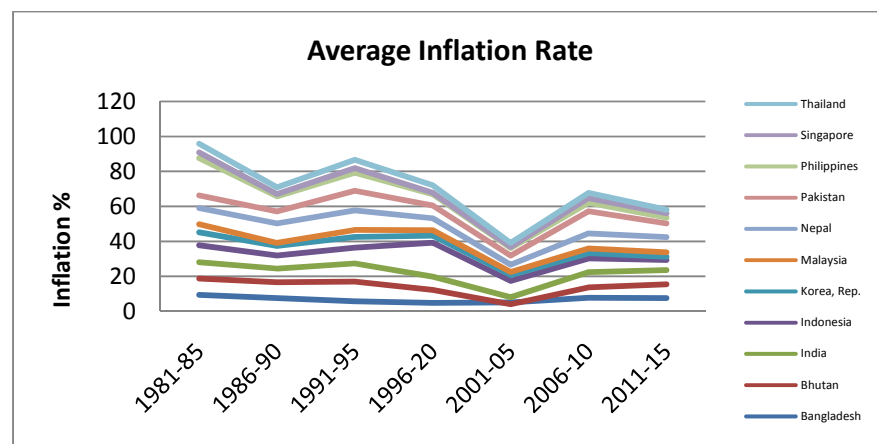


Figure 1. Average Inflation Rate

Source: Based on data from world development indicators(WDI).

The monetary authorities across the world use different variables and policy instruments to differentiate between different monetary policies regimes in order to target the primary objective of price stability. Besides this, several monetary instruments such as interest rate, credit rate and exchange rate are employed by various economies around the globe to strengthen price stability and to avoid fluctuation in prices. So, in the present era, control of inflation has become one of the prime objective in many countries of the world (Islam, 2008) . The present study addresses several major issues in the monetary policy of the selected countries and the effect of globalization on it. First, it observes the importance of global and regional determinants as the important drivers of domestic

inflation. Second, it also considers the role of global factors playing in the inflation dynamics of selected economies.

Table 2: Globalization Trend (Average)

| | 1981-85 | 1986-90 | 1991-95 | 1996-20 | 2001-05 | 2006-10 | 2011-15 |
|-------------|----------|----------|----------|----------|----------|----------|----------|
| Bangladesh | 23.06537 | 26.82065 | 32.32663 | 35.06474 | 39.20256 | 43.18622 | 45.48262 |
| Bhutan | 26.70957 | 27.24483 | 27.91895 | 28.612 | 31.32109 | 35.72429 | 38.9993 |
| India | 33.29608 | 34.53485 | 38.01448 | 45.17179 | 51.32411 | 57.18998 | 57.654 |
| Indonesia | 39.72103 | 42.05065 | 47.98671 | 56.12093 | 58.72182 | 61.44614 | 62.08685 |
| Korea, Rep. | 46.48485 | 47.43766 | 53.12 | 62.35021 | 68.40214 | 73.66996 | 76.30518 |
| Malaysia | 57.41489 | 59.94881 | 64.85972 | 71.17745 | 75.59833 | 77.59598 | 78.95193 |
| Nepal | 22.94017 | 27.54851 | 32.64848 | 35.34117 | 36.79249 | 41.97968 | 44.91715 |
| Pakistan | 34.28623 | 37.29429 | 43.18904 | 46.98245 | 51.39936 | 54.63907 | 53.62368 |
| Philippines | 41.98892 | 43.24205 | 49.56418 | 56.36972 | 61.78712 | 63.10786 | 63.30327 |
| Singapore | 67.55568 | 70.05491 | 73.30662 | 76.53167 | 79.27734 | 81.0766 | 80.15773 |
| Thailand | 39.93084 | 43.06264 | 50.29182 | 58.39148 | 63.6908 | 65.9674 | 68.55958 |

Source: Based on data from updated index of globalization by Gygli, Savina, Florian and Jan-Egbert sturm 2018.

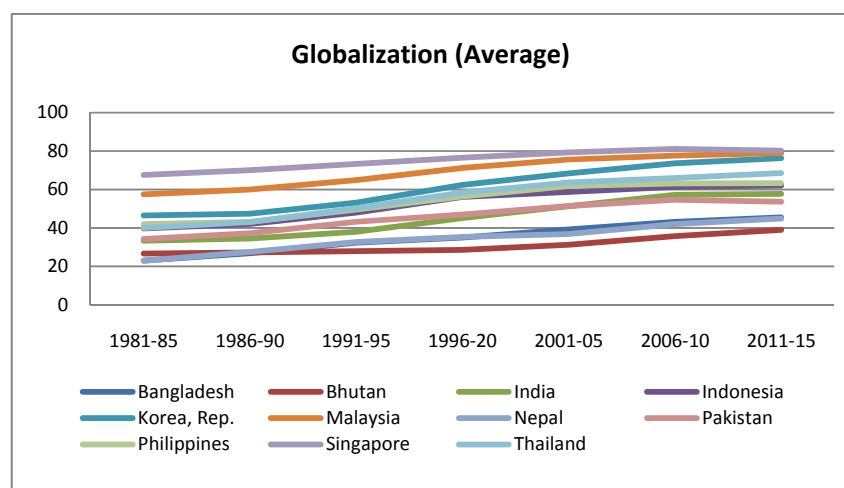


Figure 2. Globalization (Average)

Source: Based on data from updated index of globalization by Gygli, Savina, Florian and Jan-Egbert sturm 2018.

The purpose of current study is to point out the relationship among monetary policy, globalization and inflation in selected countries.

Literature Review

The relationship of globalization, monetary policy and Inflation has led to an increasing attention of academics, economists and policy-makers over the last few years. However, relatively less emphasis on the effect of globalization on inflation dynamics and the implications related to this for monetary policy and financial stability has been observed. The present study, therefore, is an attempt to explore the possible dimensions of the Nexus.

Existing literature on the impact of openness on inflation found mixed evidence. Romer (1993), Badinger (2008), Mukhtar (2010), Sikdar et al. (2013), Farvaque and Shah (2009) provided empirical evidence confirming the positive impact of globalization on inflation, while Zakaria (2010), Lotfalipour et al (2013), Munir and Kiani (2011) and Munir et al (2015) pointed out drastic effect of globalization on inflation.

Romer (1993) stated that trade and financial openness play a considerable role in lessening inflation. The study utilized average inflation, average share of imports in GDP, real per capita income, CPI/GDP deflator, political instability index, central bank dependence index and land area were used to measurement. The results of the study reveal that the most open economies have observed low inflation rate. In another study conducted by Chen et al (2004) also confirmed that openness also contributes to the reduction of inflation. The study described two channels through which globalization affects inflation such as markup and productivity. The study concluded that if monetary policy remains unchanged, with the fall in markup and rise in productivity being induced by increased import shares, it leads to a substantial decrease in aggregate inflation. On the contrary, Alfaro (2005) investigated a panel of 130 countries for the period of 1973-1998 and found that the openness did not play any significant role in causing inflation in the short-run. Nasser et al (2006) analyzed Romer's (1993) and Teraa's (1998) hypotheses that proposed negative relationship between inflation and openness and found such relationship is due to the countries that are severely indebted. The results of the study justified Romer's (1993) findings that such inverse relationship between openness and inflation is neither limited to some specific countries nor limited to particular time span, while Terra (1998) hypothesis was rejected. Among the reputed researchers, Ball (2006) analyzed the impact of openness on inflation for 14 industrial countries for the time period of 1985-2005. The study found that foreign output variations had no significant impact on the domestic inflation in the sample of 14 industrial countries. Same results were also observed by Badinger (2009) who found an inverse relationship between globalization and inflation by utilizing 91 countries covering the period 1985-2004. Moreover, examining the 'Taylor Rule', the study concluded that free trade countries showed lower rates of inflation as well as larger output-inflation tradeoff. Another research carried out by Farvaque and Shah (2009) examined correlation between globalization and inflation in comparison with developing and developed countries. The study by employing GMM and instrumental variable method estimated Phillips curve equation for thirty-seven countries to compare the inflationary dynamics of twenty-one industrialized countries and sixteen developing countries from Asia. The results confirmed that inflation was positively related with the cyclical variations in output. Contrary to this, Taghipour and Mousavi (2011) explored the relationship between financial globalization and regulation of monetary policy in a sample of 22 developing countries (Middle East, South Africa and Asia) over the period of 1990 to 2006. The results of the study confirmed an inverse relationship between financial openness and inflation rates. The Romer's hypothesis was rejected in the study of Samimiet al (2012) who utilized panel data for developed and developing countries for the period 1990-2009. Kurihara (2013) analyzed the existence of relationship between openness and inflation in Asian and member countries of Organization of Economic Corporation and Development by employing fixed effect, GMM and Chow test. The findings of the study illustrated a significant relationship between inflation and openness, and the stronger impact of openness was observed in Asia as compared to OECD countries. The study conducted by Sepehri-vand and Azizi (2016) observe positive relationship between inflation and openness in D-8 countries using panel data from 2001-2013. As most of the literature exists on the issue comprising of developed countries, this study aims at bridging the gap and intends to capture all possible dimension of the issue.

Milton Friedman (1970) famous proposition “Inflation is always and everywhere a monetary phenomenon” has been a major concern of innumerable researches. Moreover, according to quantity theory of money, Prof Irving Fisher¹ put forward, “double the quantity of money double will be the level of prices.” Inflation targets in a country are set by government, and its central bank is responsible to devise monetary policy in such a way as to actualize these targets.

There are various channels through which monetary policy works such as interest rate, exchange rate, wealth effect, credit channel but it is difficult to determine the most effective among them. This research, hence, in the light of decades of theoretical and empirical work on the channels of monetary transmission has produced a comprehensive review in relation with Asian economies. Cabrera and Lagos (2000) observed feeble effects of interest rate on output and inflation for the economy of Chile by using SVAR model from 1986 to 1997. The time periods before inflation targeting and the inflation targeting regime were studied. Another study was conducted by Petreski (2009) to review of existing literature regarding theoretical and empirical relationship between economic growth and exchange rate policy. The findings of the study explained that nominal exchange rate had no effect on long-term economic stability. In addition, the study did not indicate any confirmed association between economic stability and exchange rate. Mukherjee and Bhattachariya (2011) conducted a study for 17 developing and 9 industrial countries and concluded that the adoption of IT did not significantly alter the traditional Keynesian interest rate channel among the selected countries. Munir and Qayyum (2014) utilized the Factor Augmented Vector Autoregressive (FAVAR) to examine the monetary policy effects on Pakistan’s economy. The study concluded that monetary policy affected real variables in the short-run and the nominal variables in the long run. Ahmed *et al* (2014) analyzed the role of various factors causing inflation in Pakistan. The findings of the study explained that fiscal policy was one of the significant tools in controlling inflation. Furthermore, exchange rate and import price index also responded positively to determine inflation in Pakistan. On the contrary, Shakir (2016) found quite different results of monetary policy asserting that with an increase in the supply of money, real lending rate decreased.

The present study empirically analyzes the effect of different monetary policy instruments on inflation rate. According to the available literature less consideration has been given to the comparative empirical analysis of different monetary policy channels in the presence of globalization. The current study comprehensively analyzed these channels to determine the most appropriate monetary channel to manage inflation in the era of globalization and foreign shocks. It is expected to be a worthwhile addition in the available literature regarding this issue.

Panel Analysis, Models and Estimation Issues

This part of study deals with collection and compilation of data and its sources, specification and structure of the models and estimation of results.

Models Specification

The aim of present study is to inspect the influence of monetary policy and globalization on inflation for emerging regions of Asia i.e. South Asia and South East Asia. The study utilized standard Phillips curve equation and augment it with monetary policy, globalization variable and domestic output gap (computation is done by applying HP-filter technique)². The present study utilized linear form of the regression equations for all the selected regions.

INFLATION, GLOBALIZATION AND MONETARY POLICY

$$INF_{it} = \alpha_0 + \alpha_1 MS_{it} + \alpha_2 RIR_{it} + \alpha_3 REER_{it} + \alpha_4 OG_{it} + \alpha_5 YD_{it} + \epsilon_A$$

¹‘The Purchasing power of Money’ by Irving Fisher, published in 1911

² Discussion of domestic output gap computation is not included keeping in view the objectives/length of the study. However can be provided on request

INFLATION, GLOBALIZATION(DEFAC TO) AND MONETARY POLICY

$$INF_{it} = \beta_0 + \beta_1 MS_{it} + \beta_2 RIR_{it} + \beta_3 REER_{it} + \beta_4 OGDF_{it} + \beta_5 YD_{it} + \epsilon_B$$

INFLATION, GLOBALIZATION (DEJURE) AND MONETARY POLICY

$$INF_{it} = \gamma_0 + \gamma_1 MS_{it} + \gamma_2 RIR_{it} + \gamma_3 REER_{it} + \gamma_4 OGDJ_{it} + \gamma_5 YD_{it} + \epsilon_C$$

Where subscripts ‘i’ and ‘t’ respectively denote Cross section and time series. Asia; α ’s, β ’s and γ ’s shows values of coefficients for three equations; and ϵ ’s are the indication of error terms.

Definition/Notation/construction and source of variables

The following macroeconomic variables are used in above said models in Table 3.

Table 3: Description/construction/source of Variables

| Notation | Variable Name | Description/Source of Variable | Proxy For |
|----------|---------------------------------|--|---|
| Inf | Inflation rate | This variable has been taken from world development indicators. | Macro variable |
| MS | Money supply growth rate | This variable is composed by taking the difference of current supply of money from the previous and divide the outcome on previous year money supply | Monetary Policy Instruments |
| IR | Interest Rate | Real interest rate. This variable has been taken from international financial statistics database | |
| REER | Real Effective Exchange Rate | The data of this variable has been obtained from Bruegel data set | |
| KOFGI | Globalization | The variables represent globalization has been taken from KOF globalization index of globalization prepared at the Swiss Federal Institute of Technology[(Dreher, 2006;updated in Gygli, Savina, Florian and Jan-Egbert sturm 2018)]. | Globalization/Integration |
| KOFGIDJ | De jure index of globalization | | |
| KOFGIDF | De facto index of globalization | | |
| YD | Domestic output gap | This variable is composed by taking difference of real output with potential output through applying Hodrick-Prescott filter . The data of GDP has been taken from World Development Indicators (CD – ROM 2015) in constant dollar form. | Domestic output gap influence and taken as control variable |

To investigate the impact of globalization and monetary instruments on inflation in Asia Continent, the study incorporates South and South East Asian regions from 1981 to 2016. For South Asian region, the study includes Bangladesh, India, Bhutan, Pakistan and Nepal, while Indonesia, Korea Republic, Philippines, Malaysia, Singapore and Thailand from South East Asia region.

Methodology

This section describes the econometric methodology used in the study in detail..

First generation Unit Root Test

The tests pertaining to first generation have been developed by Levin, Lin and Chu test (2002), Im-Pesaran and Shin test (2003), Harris and Tzavalis (1999), Maddala and Wu (1999), Hadri

(2000) and Fisher-type tests. These are depending on the assumption of cross-sectional independence and these are criticized on the bases of this assumption³.

Levin-Lin-Chu (2002)

Levin-Lin-Chu (LLC) test is utilized to observe the existence of unit root with the null hypothesis that time series containing a unit root against the alternative of time series is stationary with the assumption of cross sectional independency in panel data. The structural form of the LLC analysis may be written as

$$dY_{it} = \alpha Y_{it-1} + \beta_{0i} + \beta_1 + \mu_{it} \quad i=1,2,\dots,N, t=1,2,\dots,T \quad (\text{Barbieri,2009})$$

here $\mu_{it} = \sum_{j=1}^{\infty} \gamma_{ij} \mu_{it-j} + \epsilon_{it}$

and it follows an autoregressive moving average stationary process for each cross section and independently distributed across all panel entities. This restrictive test is more feasible for moderate size of panel ($10 < N < 250$ and $25 < T < 250$). However, it has some limitations because it depends on cross sectional independence assumption and hence not applicable in cross sectional correlation. These problems were solved by Im, Pesaran and Shin (IPS) (1997, 2003)

Im, Pesaran and Shin (1997, 2003)

IPS test is dependent on less restrictive assumptions as compared to LLC. The structural form of IPS analysis may be written as follows

$$dY_{it} = \beta_{0i} + \gamma_i Y_{it-1} + \sum_{j=1}^{\gamma_i} \delta_{ij} \alpha Y_{it-j} + \epsilon_{it} \quad i=1,2,\dots,N, t=1,2,\dots,T \quad (\text{Barbieri,2009})$$

The null hypothesis of this test equips that all series contain a unit root against the alternative hypothesis. Heterogeneity of the dynamics, residual serial correlation and error variance across groups are allowed by this test.

Cointegration Test

An ARDL model was employed for cointegration process by using Mean and Pooled Mean group estimation procedure. To accomplish the cointegration task, the study employed three types of co integration tests developed by Kao, Pedroni and Westerlund.

Mean Group Estimator (MG)

Pesaran relaxes the assumption of homogeneous coefficients in mean group estimation procedure. The slope coefficients of the variables, intercepts and error variances are heterogeneous across cross section data in mean group technique. The mean group estimators present unique values for constant, slope and error term across groups. In case of large time dimension (T) then cross sections (N), the use of mean group estimator is an appropriate choice and provides consistent and credible estimates. However, it is not an appropriate method in case of larger (N) and smaller time dimension.

In order to formulate the long run coefficients, Pesaran et al (2001) utilized Auto Regressive Distributed Lag (ARDL) model for each cross section and formulated the mean group estimators for each cross section. It is further argued by Pesaran et al (2001) to estimate ARDL model, the adoption of same order of integration for variables is not compulsion.

ARDL model is explained as follow

$$INF_{it} = \beta + \delta_i INF_{it-1} + \phi_i X_{i,t-i} + \epsilon_{it}$$

Where i stands for the cross sections (countries) and t illustrates time span. $X_{i,t-i}$ indicates all the exogenous macroeconomic variables such as domestic output gap, monetary policy variables, globalization index and ϵ_{it} is the error term.

To measure the long run coefficients of mean group estimator, the study has employed this equation

³ Second generation test based on the assumption of cross sectional dependence are also performed and can be provided on request

$$\gamma_i = \phi_i / (1 - \delta_i)$$

Further, it can be written as for the entire panel

$$\gamma_i = \sum_{i=1}^N \gamma_i$$

Pooled Mean Group Estimator (PMG)

Catao and Terrones (2005) asserted that assumption of homogeneity holding mean group estimates resulted in inefficient estimators. Moreover, Pesaran and Smith (1995) criticized identical dynamic specification for all countries in the panel; however, it might follow identical specification in the long run. Hence, Pesaran et al (1997, 1999) proposed a novel technique known as Pooled Mean Group (PMG) estimator to estimate non-stationary dynamic panels. PMG estimator is based on a combination of amalgamation and averaging of coefficients (Pesaran et al., 1997, 1999), and such estimators lie between the mean group and fixed effect estimators. The Pool Mean Group estimator permits short run parameters, intercepts terms and error variance to differ across groups (as in MG estimator); however, it restrict the long run coefficients to be equivalent.

Panel Auto Regressive Distributed Lag (ARDL) system of equations is

$$INF_{it} = \sum_{j=1}^p \alpha_j INF_{i,t-j} + \sum_{j=0}^q \beta_j X_{i,t-j} + w_t + \epsilon_{it}$$

Where subscript i represents the cross sections (countries) N=1,2,3,.....N and t indicates time period t= 1,2,3,.....T. X_{i,t,j} indicates all the explanatory variables including domestic output gap, monetary policy variables, globalization index; w_t represents group specific effect, while term ϵ_{it} is the white noise error term. A most important feature of co integrated variables is that they rejoin any deviation for long run. So, the study re-parameterized our above equation into error correction equation

$$\Delta INF_{it} = \theta_i INF_{i,t-j} + \phi_i X_{i,t-j} + \sum_{j=1}^{p-1} \alpha_j \Delta INF_{i,t-j} + \sum_{j=0}^{q-1} \beta_j \Delta X_{i,t-j} + w_t + \epsilon_{it}$$

The error correction parameter θ_i shows the value of speed of adjustment towards equilibrium, and if $\theta_i = 0$, it will exhibit the non existence of long run in the model.

Dumitrescu and Hurlin Panel Causality Test

In this test, Homogenous Non-Causality (HNC) hypothesis has been used for causality of heterogeneous panels. The null hypothesis indicates the non causal relationship between any economy of the panel, which is known as Homogenous Non-Causality (HNC) hypothesis as written below:

$H_0 : \beta_i = 0$ $H_1 : \beta_i \neq 0$. This modern technique of panel causality has also been advocated by earlier researchers like Akbas et al., 2013 and Bayar, 2015.

Results and Discussion

Tables 4 and 5 reveal the levels of stationarity of macroeconomic variables with reference to the South Asia and South East Asian region. The study rejects Null Hypothesis (non-stationarity) of unit root test on the basis of P value (should be less than 0.05) and deduces that all the concerned variables are of mixed order of integration, it, hence, fulfills the basic condition for applying panel ARDL.

Table 4: Panel Unit Root Test at Level

| Variable | With Intercept | | With Intercept and Trend | |
|----------|------------------|------------------|--------------------------|------------------|
| | LL | IPS | LL | IPS |
| INF | -1.77* (0.04) | -5.54* (0.00) | -0.10* (0.50) | -4.39* (0.00) |
| MS | -6.46* (0.00) | -6.47* (0.00) | -6.43* (0.00) | -5.85* (0.00) |

| Variable | With Intercept | | With Intercept and Trend | |
|----------|------------------|------------------|--------------------------|------------------|
| | LL | IPS | LL | IPS |
| RIR | -3.28* (0.00) | -4.82* (0.00) | -2.68* (0.03) | -3.93* (0.00) |
| REER | -5.06* (0.00) | -4.01* (0.00) | -1.56** (0.06) | 0.49** (0.67) |
| YD | -5.41* (0.00) | -8.15* (0.00) | -4.33 (0.00) | -6.44* (0.00) |
| OG | -2.01* (0.02) | 2.42 (0.99) | 4.55 (1.00) | 4.37 (1.00) |
| OGDF | -2.58(0.00)* | 1.13(0.87) | 2.34(0.99) | 3.38(0.99) |
| OGDJ | 0.03(0.51) | 4.25(1.00) | 2.021(0.98) | 2.12(0.98) |

The Signs '*', '**' show that test statistic are significant at 5% and 10% level respectively. Test statistics are reported, the value given in parenthesis () is probability value.

Table 5: Panel Unit Root Test at First Difference

| Variable | With Intercept | | With Intercept and Trend | |
|----------|-------------------|-------------------|--------------------------|-------------------|
| | LL | IPS | LL | IPS |
| INF | -9.20* (0.00) | -17.26* (0.00) | -5.37* (0.00) | -15.49* (0.00) |
| MS | -13.33* (0.00) | -17.83* (0.00) | -10.52* (0.00) | -16.25* (0.00) |
| RIR | -13.41* (0.00) | -15.95* (0.00) | -13.26* (0.00) | -14.30* (0.00) |
| REER | -6.70* (0.00) | -7.55* (0.00) | -7.43* (0.00) | -8.61 (0.00) |
| YD | -12.43* (0.00) | -13.63* (0.00) | -10.39* (0.00) | -11.73* (0.00) |
| OG | -7.05* (0.00) | -8.60* (0.00) | -6.21* (0.00) | -7.74* (0.00) |
| OGDF | -9.68(0.00)* | -9.86(0.00)* | -9.21(0.00)* | -9.29(0.00)* |
| OGDJ | -6.55(0.00) | -7.58(0.00) | -5.92(0.00) | -5.90(0.00) |

The Signs '*', '**' illustrate that test statistic are significant at the level of 5% and 10%. The test statistics are given, the value specified in parenthesis () is P value.

Table 6 describes the results of Pedroni, Kao and Westerlund Residual Panel Co-integration test. Null hypothesis (no cointegration) is rejected for Panel Co-integration on the basis of P values and presence of Panel Co-integration is inferred. After tracing out Panel Co-integration, the study has applied Panel ARDL estimation technique for measuring the coefficients of the selected variables.

Gt and Ga represent group mean statistics and Pt and Pa explains panel mean statistics

Table 7 highlights the panel estimation provided by the pooled mean group and mean group estimation technique. The significance of the macroeconomic variables is inspected by utilizing probability value that must be less than 0.05. On the basis of the conclusion drawn by applying Hausman test, Pooled Mean group estimation technique is preferred.

Table 6: Results of Co integration Test Inflation, globalization and monetary policy (Dependant variable is inflation)

| Models | | 1 | 2 | 3 |
|--|---|---------------|---------------|----------------|
| Kao | Alternative Hypothesis: Cointegration is Present | | | |
| | T | -6.452 (0.00) | -6.403 (0.00) | -6.577 (0.00) |
| Alternative Hypothesis : Cointegration with Common AR Coefficients | | | | |
| Pedroni | Pv | 0.992 (0.161) | 1.119 (0.132) | 1.948 (0.010) |
| | Prho | -2.345 (0.00) | -2.236 (0.01) | -2.324(0.01) |
| | Ppp | -7.166 (0.00) | -6.701 (0.00) | -7.444(0.00) |
| | Padf | -3.349 (0.00) | -3.004 (0.00) | -3.570 (0.00) |
| | Alternative Hypothesis: Cointegration with Individual AR Coefficients | | | |
| | Grho | -1.163(0.12) | -1.066 (0.14) | -1.167 (0.122) |
| | Gpp | -7.78 (0.00) | -7.407 (0.00) | -8.088 (0.00) |
| | Gadf | -3.432 (0.00) | -2.947(0.001) | -0.37 (0.35) |
| Westerlund | Alternative Hypothesis: Cointegration is Present | | | |
| | Gt | -4.95(0.00) | -4.85(0.00) | -4.93(0.00) |
| | Ga | -19.96(0.023) | -19.89(0.02) | -19.60(0.31) |
| | Pt | -14.97(0.00) | -14.98(0.00) | -14.86(0.00) |
| | Pa | -19.97(0.00) | -19.91(0.00) | -19.25(0.00) |

Note: Values reported in brackets are p values

Table 7 :Panel ARDL(2,1,1,1,1) Long Run Results (Dependant Variable inflation rate)

| Variable | 1 | | 2 | | 3 | |
|----------|----------------|-------------------|--------------|-------------------|-----------------|-------------------|
| | Mean Group | Pooled Mean Group | Mean Group | Pooled Mean Group | Mean Group | Pooled Mean Group |
| MS | -0.030(0.854) | 0.033(0.054) * | 0.249(0.275) | 0.034(0.06) * | -0.041(0.80) * | 0.033(0.051) * |
| RIR | -0.95(0.00) * | -0.376(0.00) * | 0.202(0.869) | -0.06(0.00) * | -1.133(0.00) * | -0.040(0.00) * |
| REER | -0.0471(0.583) | -0.052(0.00) * | 0.235(0.513) | -0.336(0.00) * | -0.041(0.519) | -0.393(0.00) * |
| YD | 1.994(0.115) | 0.194(0.000) * | -0.141(0.89) | 0.250(0.00) * | 1.074(0.082) | 0.155(0.00) * |
| OG | -0.65(0.02) * | -0.184(0.00) * | – | – | – | – |
| OGDF | – | – | 1.459(0.363) | -0.184(0.00) * | – | – |
| OGDJ | – | – | – | – | -0.331(0.015) * | -0.155(0.00) * |

* represent 5% level of significance. The probabilities are in parenthesis ().

Columns 1, 2 and 3 of Table 7 show that money supply (Ms) has a significant positive relationship with inflation in the long-run. When the growth rate of money supply is higher than that of GDP of a country, it hikes inflation. This argument favours the monetarists' theory which asserts that money is the main determinant of an inflationary process (Qayyum,2006).The coefficient of real interest rate (RIR) is significant in all the specifications in the selected time period (Saleem, 2010).The coefficient of real exchange rate (REER) is negatively related with inflation rate. An increase in the REER represents appreciation of currency in effective terms. Moreover, when the currency depreciates in a small open economy, it results in the increasing prices of imported goods and decreasing prices of domestic goods for foreigners. The higher prices of imported inputs increase the

cost of production of domestically produced goods, and hence the price level is positively and significantly related with domestic output gap (Hyder and Shah, 2004). Measures of globalization, de-facto and de-jure, significantly affects inflation in the selected economies. The coefficient of globalization highlights a negative relationship with inflation and explains it as 1 unit increase in globalization brings about 0.1836, 0.184 and 0.155 unit decline in the inflation (Romer (1993), Ashra (2002), Kim and Beladi (2004), and Mukhtar, 2010). The findings confirm the Romer's hypothesis and finds a negative relationship between inflation and openness in the selected countries. This implies that the traditional closed economy explanation for the inflationary process has become invalid, and adding openness variables to the analysis, therefore, is an important component to the empirical analysis for explaining this macroeconomic phenomenon.

In table 8, the results depict that the coefficient of error correction term is negative and statistically significant in short run. This indicates that model converges towards equilibrium and the speed of adjustment is found to be around sixty percent in each specification. In table 9, the findings of Panel Homogeneous Causality Test reveal the absence of causality observed between money supply growth and inflation as P value exceeds 0.05. A unidirectional causality is found between exchange rate and inflation in the selected time span. The causality moves from real effective exchange rate to inflation illustrating real effective exchange rate tends to influence inflation, but inflation in turn does not tend to influence exchange rate. There is bi-directional causality between rate of interest and inflation rate which means interest rate and inflation rate simultaneously affect each other and can be identified as major monetary policy instrument to be targeted for price stability. There is unidirectional causality between globalization, monetary policy instruments and domestic output gap. Globalization is also a major determinant to be considered while setting of any strategy for stabilization of the inflation because it indirectly causes inflation through the determinants of inflation. This study shows that the interest rate does help the future forecasting of the inflation in the short run.

Table 8 :Panel ARDL(2,1,1,1,1) Short Run Results (Dependant Variable inflation rate)

| Variables | 1 | | 2 | | 3 | |
|-----------|---------------|-------------------|----------------|-------------------|-----------------|-------------------|
| | Mean Group | Pooled Mean Group | Mean Group | Pooled Mean Group | Mean Group | Pooled Mean Group |
| ECT(-1) | -0.24(0.00) * | -0.60(0.00) * | -0.22(0.00) * | -0.57(0.00) * | -0.24(0.00) * | -0.61(0.00) * |
| DINF(-1) | 0.383(0.00) * | 0.077(0.068) | 0.391(0.00) * | 0.065(0.128) | 0.384(0.00) * | 0.071(0.06) |
| D(MS) | -0.006(0.48) | -0.007(6.629) | -0.009(0.412) | -0.004(0.793) | -0.004(0.628) | -0.012(0.33) |
| D(RIR) | 0.043(0.486) | -0.044(0.299) | 0.037(0.509) | 0.053(0.166) | 0.039(0.533) | -0.038(0.98) |
| D(REER) | 0.007(0.849) | -0.0033(0.934) | 0.006(0.0881) | 0.015(0.690) | 0.082(0.991) | 0.0008(0.33) |
| D(YD) | -0.085(0.05) | -0.1004(0.235) | -0.064(0.182) | -0.115(0.136) | 0.0862(0.049) * | 0.092(0.41) |
| D(OG) | 0.083(0.12) | 0.071(0.594) | | | | |
| D(OGDF) | | | 0.0149(0.75) | 0.084(0.33) | | |
| D(OGDJ) | | | | | 0.084(0.301) | -0.022(0.25) |
| Cons. | 9.169(0.00) * | 33.34(0.00) * | 8.754(0.002) * | 13.31(0.00) * | 8.119(0.00) * | 11.737(0.00) * |

* represent 5 percent level of significance. In parenthesis () are probabilities.

Conclusion

The main objective of this study is to highlight the issue of inflation and formation of monetary policy in the present wave of globalization with reference to the 11 South and South East Asian economies. Panel Auto regressive Distributed Lagged Model and Panel Causality Test have been utilized for econometric analysis. The study utilized standard Phillips curve equation and augments it with monetary policy, globalization variable and domestic output gap. Various specifications of

the model have been used by employing different overall defacto and dejure measure of globalization in order to assess the influence of open economy on monetary policy decisions.

The findings of the study illustrate that domestic factors are responsible for rising inflation in the region and are sensitive to monetary tightening. So, monetary authorities must be very cautious while deciding for monetary expansion in the open economy conditions, the government should take steps to deal with all those challenges which hinder the optimal and maximum utilization of resources in the economy so that the difference between actual GDP and potential GDP remains minimum. Moreover, it is observed that none of the country in the analysis has ever experienced hyper inflation and also did not decrease high inflation for decades. The monetary authorities in the region can exploit the relationship between real interest rates and inflation as other inflation targeting countries are targeting. This leaves a clear message for economic planners that inflation targeting policies may be helpful in globalized era through controlling the interest rate, money supply and country output level.

Table 9: Panel Homogenous Causality Test

| Variables | INF | | Ms | | RIR | | REER | | YD | | OG | | OGDF | | OGDJ | |
|-----------|-------|--------------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|--------------|-------|-----------------|-------|-----------------|-------|-----------------|
| | Prob. | Decision | Prob. | Decision | Prob. | Decision | Prob. | Decision | Prob. | Decision | Prob. | Decision | Prob. | Decision | Prob. | Decision |
| INF | – | – | 0.838 | No Causality | 0.000 | Causality exist | 0.003 | Causality exist | 0.123 | No Causality | 0.653 | No Causality | 0.500 | No Causality | 0.783 | No Causality |
| MS | 0.421 | No Causality | – | – | 0.010 | Causality exist | 0.408 | No Causality | 0.127 | No Causality | 0.065 | Causality exist | 0.083 | Causality exist | 0.56 | No Causality |
| RIR | 0.023 | Causality exist | 0.697 | No Causality | – | – | 0.000 | Causality exist | 0.577 | No Causality | 0.894 | No Causality | 0.354 | No Causality | 0.987 | No Causality |
| REER | 0.383 | No Causality | 0.376 | No Causality | 0.000 | Causality exist | – | – | 0.346 | No Causality | 0.000 | Causality exist | 0.000 | Causality exist | 0.000 | Causality exist |
| YD | 0.000 | Causality exist*** | 0.057 | Causality exist | 0.006 | Causality exist | 0.251 | No Causality | – | – | 0.000 | Causality exist | 0.000 | Causality exist | 0.000 | Causality exist |
| OG | .210 | No Causality | 0.000 | Causality exist | 0.055 | Causality exist | 0.683 | No Causality | 0.270 | No Causality | – | – | – | – | – | – |
| OGDF | 0.447 | No Causality | 0.131 | No Causality | 0.594 | No Causality | 0.876 | No Causality | 0.311 | No Causality | – | – | – | – | – | – |
| OGDJ | 0.303 | No Causality | 0.000 | Causality exist | 0.035 | Causality exist | 0.247 | No Causality | 0.983 | No Causality | – | – | – | – | – | – |

***, **, * represent 1, 5 and 10 percent level of significance respectively.

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