



## The Effect of Economic Globalization on Inflation in Selected Developing Countries

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### ABSTRACT

*This paper investigates the effect of economic globalization on inflation for a panel of 21 developing countries over the 1993- 2010 years. One of the most salient economic events in the past two decades has been the remarkable decrease in inflation around the world. Global inflation has dropped from around 30 percent a year in the early 1990s to under 4 percent today. Is it possible that economic globalization and a higher degree of openness have helped drive down inflation? We use the economic dimension of KOF index as a proxy for economic globalization and overall the results of both OLS and DOLS estimators show inverse and significant relationship between economic globalization and inflation in these developing countries during 1993-2010.*

**Keywords:** Economic globalization, inflation, Kof index, panel data.

### 1. INTRODUCTION

In today's world developing countries cannot isolate themselves from the world economy. The benefits of outward-looking policies which help in taking advantage of international trade and capital flows are obvious and there is evidently a move away from the typical closed economy structure in most of the developing economies. Economic Globalization is conceptualized as a process that results in increasing integration of a country's economy with the rest of the world (Akhter, 2004). As another definition, economic globalization is the increasing economic interdependence of national economies across the world through a rapid increase in cross-border movement of goods, service, technology, and capital (Joshi & Mohan, 2009).

In recent years, many researchers focused on the effects of globalization on different economic aspects, including its effect on inflation. Global inflation has dropped from around 30 percent a year in the early 1990s to under 4 percent today. Is it possible that economic globalization and higher degree of openness have helped drive down inflation?

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Inflation is defined as a rise in the general level of prices of goods and services in an economy over a period of time. It is one of the serious problems for any country, more so in developing countries due to its obvious costs to the local economic and social system. A high rate of inflation reduces the purchasing power and increases uncertainty in the economy and may adversely affect the economic growth. Therefore, maintaining non-inflationary stable economic growth has been at the core of macroeconomic policies in many developing countries. The concern with inflation stems not only from the need to maintain overall macroeconomic stability, but also from the fact that inflation hurts the poor very hard as they do not possess effective inflation hedges. On the other hand, the process of globalization and the growing integration of national economies to the global economy encourages governments to reduce barriers to trade which stimulated us to investigate the effect of economic globalization on inflation.

According to 'new growth theory', openness is likely to affect inflation through its likely effect on output (Jin, 2000). This link could be operating through: a) increased efficiency, which is likely to reduce the cost through changes in composition of inputs procured domestically and internationally, b) better allocation of resources, c) increased capacity utilization, and d) rise in foreign investment, which can stimulate output growth and ease pressures on prices (Jafari Samimi, 2012).

However, with respect to the above descriptions, it is important to know the nature of the impact of economic globalization on inflation; hence the aim of the present study is to examine the relationship between economic globalization and inflation in a sample of 21 developing countries over the 1993 to 2010 years.

The rest of this paper is organized as follows: Section 2 presents the literature review, Section 3 and 4 discusses model, data and methodology. Section 5 presents empirical results and finally conclusion is presented in Section 6.

## **2. LITERATURE REVIEW**

The relationship between inflation and openness and also economic globalization and inflation has been a subject of research, theoretical as well as empirical. Iyoha (1973) attempted to investigate the relationship between openness and inflation for a sample of 33 developing countries, he had used both yearly and 5-yearly averaged data from 1960/1 to 1964/5. Through the use of the OLS estimator he found that there is a reverse (inverse?) relationship between openness and inflation. Romer (1993) analyzed the effect of openness on inflation for a cross-section of 114 countries. He concluded that the average inflation rate is lower for smaller and relatively more open economies. His results were found to hold for a wide range of countries, except for a small group of

developed OECD countries. He had also found that the relationship between inflation and openness to be stronger in countries which are politically less stable and with less independent central banks.

Lane (1997) examined the relationship between inflation and openness by using the same data set as Romer (1993) and found the negative effect of trade openness on inflation. An interesting finding is that the openness effect is stronger and also holds for OECD countries when the country size is controlled. Terra (1998) in her paper written in response to Romer (1993) found the negative relationship between inflation and openness. Dividing the countries into 4 broad groups according to their level of debt, she concluded that this negative relation to be significantly influenced by the extent of the debt of the country.

Alfaro (2002) investigated a group of 130 developed and developing countries during 1973-1998 and found that openness does not seem to play a role in the short run in decreasing inflation, but she found a significant negative relationship between a fixed exchange-rate regime and inflation. Sachsida et al. (2003) estimated the effect of trade openness on inflation for a panel of 152 countries during the 1950-1992 period. In order to check the robustness of the results, they estimated several equations using different estimators such as Fixed effects within, Random GLS, Effects between, ML and GEE. All of the estimators indicate a negative link between inflation and trade openness, with the exception of the between estimator, that presented a positive coefficient.

Kim and Beladi (2005) studied the relation between openness and price level in 62 countries including 28 OECD and 34 developing countries over the 1947-2002 span. The results of this study show a negative relation in developing countries and a positive relation in advanced economies such as the U.S, Belgium and Ireland. Jin (2006) tried to examine the effects of increasing openness on economic growth and inflation in Japan and South Korea. Resorting to a seven-variable vector autoregressive model, he found that a significant negative impact of trade openness on inflation and economic growth for both countries in the short run but there was no effect in the long run.

Hanif and Batool (2006) tested the Romer's hypothesis that inflation is lower in more open economies. They used annual time series data for Pakistan during 1973-2005 and concluded the openness variable has a significant negative impact on the domestic price growth in Pakistan. The study of Badinger (2009) provided comprehensive evidence on the relation between inflation and globalization, using a large cross-section of 91 countries over the period 1985-2004. He defined globalization as trade and financial openness. He found that countries which were more open to trade and financial flows had lower rates of inflation. Also he did not find a robust relation between openness and inflation for the subsample of 25 OECD countries.

Jafari Samimi *et al.* (2012) tested the hypothesis that inflation is lower in more open economies. They had used the panel data technique to examine this hypothesis concerning developed and developing countries over the last two decades. Also they estimated the relationship between economic globalization as one dimension of a new KOF globalization index and inflation. Using the traditional measure of trade openness  $[(EX+IM)/GDP]$  they found a positive and significant relation between openness and inflation. On the contrary, the results of using the economic dimension of KOF index indicated that higher economic globalization will decrease inflation for both developing and developed countries during 1990-9 and 2000-9. Zakaria (2010) examined the relationship between trade openness and inflation in Pakistan. He used an annual time-series data for the period 1947 to 2007 and concluded that there is a positive relation between trade openness and inflation in Pakistan.

### **3. MODEL SPECIFICATION AND DATA**

#### **3.1 Model specification**

The inflation outcome in developing countries could be influenced by many variables. Monetarists argued that inflation is always and everywhere a monetary phenomenon (Ashra, 2002) and increase in money supply is the only cause of inflation. So the rate of money growth is one of the inflation determinants in this paper.

Following Ramsey (1927), Phelps (1973) argues that, since seigniorage is a source of government revenue, the marginal deadweight loss of inflation should be equated to the marginal deadweight loss of other taxes. Presumably the marginal deadweight loss of other taxes is greater when the government must raise more revenue. So, assuming the relevant portion of the seigniorage Laffer curve is upward sloping, larger governments should have higher inflation rates, more seigniorage, and a greater marginal deadweight loss from inflation (Han and Mulligan, 2001).

Also the mutually reinforcing effects of globalization, deregulation and widespread reduction of the role of government, have, no doubt, sharply increased competition, and lowered “quasi-rents” to monopolistic firms and unions (Rogoff, 2003).

There is a lot of research on the relationship between inflation and economic growth. Gokal and Hanif (2004) investigated the relationship between inflation and economic growth. The results of this paper indicated that a negative correlation exists between inflation and growth, while the change in the output gap bears significant bearing. The causality between the two variables ran one-way from GDP growth to inflation. According to Unger and Ziberfarb (1993)

increased output growth could lead to higher inflation but lower inflation uncertainty. Apergis (2004) indicated that output growth causes inflation and vice versa. In other words, there are feedback effects between inflation and output growth. It is clear that the increased production of goods and services in the economy will lead to the release the pressure on domestic prices, and for this aim we add GDP per capita to the model.

In this paper, we will follow the model presented by Jafari Samimi et.al (2012) to analyze the effect of economic globalization on inflation. The model can be specified as follows:

$$IN = \beta_0 + \beta_1 EG_{it} + \beta_2 GP_{it} + \beta_3 GS_{it} + \beta_4 MG_{it} + U_{it} \quad (1)$$

Where IN is inflation, EG is the economic dimension of KOF index which measures economic globalization, GP is GDP per capita, GS is government size (General government final consumption expenditure (% of GDP) and finally MG is money growth.

### 3.2 Data

The use of panel data has several benefits in contrast with the time series data: controlling for individual heterogeneity and more informative data, more variability, less colinearity among the variables, and more efficiency (Baltagi, 2005). Therefore, this paper applied the panel data of 21 developing countries over the 1993 to 2010 years. (Sample of countries: Argentina, Bangladesh, Chad, China, Ecuador, Ghana, Hungary, India, Iran Islamic Rep, Malaysia, Mexico, Pakistan, Paraguay, Peru, Philippines, Poland, Romania, Syrian Arab Republic, Thailand, Turkey and Uruguay<sup>4</sup>). The annual data of economic globalization are taken from the KOF index of globalization and other data obtained from WDI.

## 4. METHODOLOGY

### 4.1 Panel Unit Root Test

Several Panel unit root tests presented to investigate the stationary properties of panel data. This paper applied four tests proposed by Levin et al. (LLC, 2002), Im et al. (IPS, 2003), Breitung (2000) and Fisher-type test proposed by Maddala and Wu (1999) and Choi (2001) to test the null hypothesis of having unit root.

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<sup>4</sup>These countries are classified in developing countries according to the International Monetary Fund's World Economic Outlook Report 2012

Following Dickey and Fuller (1979, 1981), Levin and Lin (1993), and Levin, Lin and Chu (2002), consider a panel extension of the null hypothesis that each individual time series in the panel contains a unit root against the alternative hypothesis that all individual series are stationary.(Hsiao, 2003).

The adjusted t-statistic of LLC is:

$$t_{\rho}^* = \frac{t_{\rho} - NT\hat{S}_N \hat{\sigma}_{\tilde{\varepsilon}}^{-2} \hat{\sigma}(\hat{\rho}) \mu_{m\tilde{T}}^*}{\sigma_{m\tilde{T}}^*} \tag{2}$$

Where  $\mu_{m\tilde{T}}^*$  and  $\sigma_{m\tilde{T}}^*$  are the mean and standard deviation adjustments provided by table 2 of LLC. Levin, Lin and Chu show that  $t_{\rho}^*$  is asymptotically distributed as  $N(0, 1)$ .

The test of Im, Pesaran and Shin (IPS, 2003) allow for a heterogeneous coefficient of  $y_{it-l}$  and propose an alternative testing procedure based on averaging individual unit root test statistics. IPS suggests an average of the ADF tests when  $u_{it}$  is serially correlated with different serial correlation properties across cross-sectional units.

The t-statistic of IPS can be expressed as follows:

$$t_{IPS} = \frac{\sqrt{N}(\bar{t} - \frac{1}{N} \sum_{i=1}^N E[t_{iT} | \rho_i = 0])}{\sqrt{\frac{1}{N} \sum_{i=1}^N \text{var}[t_{iT} | \rho_i = 0]}} \Rightarrow N(0,1) \tag{3}$$

Values of  $E[t_{iT} | \rho_i = 0]$  and  $\text{var}[t_{iT} | \rho_i = 0]$  obtained from the results of Monte Carlo simulations carried out by IPS.

As mentioned in Baltagi (2005), LLC and IPS tests may not keep nominal size well when either  $N$  is small or  $N$  is large relative to  $T$ . Breitung (2000) found that the LLC and IPS tests suffer from a dramatic loss of power if individual-specific trends are included. Breitung suggests a test statistic that does not employ a bias adjustment whose power is substantially higher than LLC or the IPS tests using Monte Carlo experiments. The test statistic of Breitung (2000) panel unit root test has the following form:

$$\lambda_B = \frac{\sum_{i=1}^N \sigma_1^{-2} y_i^* X_i^*}{\sqrt{\sum_{i=1}^N \sigma_1^{-2} X_i^* A' A_i^*}} \quad (4)$$

Maddala and Wu (1999) and Choi (2001) proposed a Fisher-type test of unit root, which combines the  $p$ -values from unit root tests for each cross-section  $i$  to test for unit root in panel data. The Fisher test is nonparametric and distributed as chi-square with two degrees of freedom:

$$p\lambda = -2 \sum \log_e \pi_i \quad (5)$$

## 4.2 Panel Cointegration Test

Several tests are presented to examine the existence of cointegration in panel data. This paper applied the panel cointegration test of Pedroni (1999, 2004) and Kao (1999).

Pedroni presented seven statistics for testing the null hypothesis of no cointegration in panel data. Four statistics called panel cointegration statistics and based on pooling along what is commonly referred to as the within-dimension. Another three statistics developed by Pedroni called group-mean panel cointegration statistics, are based on pooling along what is commonly referred to as the between-dimension.

Kao (1999) introduced parametric residual-based panel cointegration. He expanded four DF-types and one ADF-type tests for testing the null hypothesis of no cointegration. The tests are based on the spurious least squares dummy variable (LSDV) panel regression equation with a single regressor.

## 5. EMPIRICAL RESULTS

### 5.1 Panel Unit Root Test

The results of Im et al. (IPS, 2003), Levin et al. (LLC, 2002), Breitung (2000) and Fisher-type panel unit root test reported in Table 1.

Table 1: Panel Unit Root Tests

Variable Test	<i>IN</i>	<i>EG</i>	<i>GP</i>	<i>GS</i>	<i>MG</i>
IPS (2003)	-0.801 (0.21)	-0.109 (0.45)	11.723 (1.00)	-1.618 (0.05)	-1.583 (0.05)
LLC (2002)	-0.483 (0.31)	-3.218 (0.00)	14.685 (1.00)	0.512 (0.69)	0.415 (0.66)
Breitung (2000)	1.253 (0.89)	0.545 (0.70)	6.594 (1.00)	-1.348 (0.08)	-1.593 (0.05)
ADF-Fisher	45.644 (0.32)	47.769 (0.24)	13.200 (1.00)	49.192 (0.20)	47.790 (0.24)
PP-Fisher	117.303 (0.00)	60.169 (0.03)	3.102 (1.00)	84.688 (0.00)	143.951 (0.00)

*Note:* Probability values are reported in parenthesis.

The results of several panel unit root tests indicate that GDP per capita is non-stationary in level. The results of different panel unit root tests are mixed for other variables, but we can conclude from Table 1 that all variables are non-stationary in levels. In presence of unit root we may estimate spurious regression, therefore we must test for cointegration in the next step to find that model is cointegrated or not. If the results show the existence of cointegration, then we can estimate the model with trust to the results.

## 5.2 Panel Cointegration Test

The results of Pedroni and Kao panel cointegration tests, respectively, are presented in Tables 2 and 3.

Several statistics reported on these tables indicates that the null hypothesis of no cointegration is strongly rejected, which implies the existence of long-run relationship in the model.

Table 2: Pedroni Panel Cointegration Test

Statistics	
Panel $\nu$ -statistic	14.978 ***
Panel $\rho$ -statistic	-58.838 ***
Panel non-parametric (PP) $t$ -statistic	-16.045 ***
Panel parametric (ADF) $t$ -statistic	-3.905 ***
Group $\rho$ -statistic	-64.656 ***
Group non-parametric $t$ -statistic	-16.754 ***
Group parametric $t$ -statistic	-18.156 ***

*Note:* \*\*\*, \*\* and \* denote statistical significance at the 1, 5 and 10% levels, respectively.

Table 3: Kao Panel Cointegration Test

Statistics	
$DF_{\rho}$	-14.050***
$DF_{\tau}$	-9.620***
$DF_{\rho}^*$	-21.795***
$DF_{\tau}^*$	-9.764***
$ADF$	-8.118***

*Note:* \*\*\*, \*\* and \* denote statistical significance at the 1, 5 and 10% levels, respectively.

### 5.3 Model Estimates

Finally after acceptance of cointegration, in the last step we estimate the models with two estimators, OLS estimator and Dynamic OLS (DOLS) estimator proposed by Kao and Chiang (2000). Monte Carlo results of Kao and Chiang illustrate the OLS estimator has a non-negligible bias in finite samples and DOLS outperforms both the OLS and FMOLS estimators. So the DOLS is the main estimator used in this paper for inference of the model. The estimation results of the model reported in Table 4.

Table 4: Estimation Results of Model

Variable	OLS Coefficient	DOLS Coefficient
EG (t-statistic)	-0.306 ***	-0.231 ***
GP (t-statistic)	-0.0033 ***	-0.0047 ***
GS (t-statistic)	0.546 *	0.481 **
MG (t-statistic)	0.692 ***	0.541 ***
$R^2$	0.70	0.78
Adjusted $R^2$	0.67	0.72

**Note:** \*\*\*, \*\* and \* denote statistical significance at the 1, 5 and 10% levels, respectively.

The result of estimating the model indicates that all coefficients are significant and consistent with theories. The coefficient of economic globalization of the KOFindex is negative and significant, which supports the negative relationship between openness and inflation hypothesis. Also, the coefficient of GDP per capita has the expected sign.

## 6. CONCLUSION

There are many empirical studies about the relationship between openness and inflation but the work on this issue is still debatable among economists. As previously mentioned, it is important to understand the nature of the impact of economic globalization on inflation. Thus; this paper examined the relationship between economic globalization and inflation for a panel of 21 developing countries. For this purpose, we employed a non-stationary panel data method.

The results of panel unit root tests indicate that all variable are non-stationary in levels and panel cointegration test indicate the existence of long-run relationship in model. We generate consistent estimates by employing DOLS estimator proposed by Kao and Chiang (2000). The results of DOLS estimator indicate a negative relationship between economic globalization and inflation. This result strongly supports the hypothesis of Romer (1993) that present inflation is lower in more open economies. The results suggest that policy makers can take to perform programs that enhance the economic integrations with the rest of the world, to achieve the macroeconomic objectives such as reducing inflation.

## REFERENCES

- Apergis, Nicholas. (2004). Inflation, output growth, volatility and causality: evidence from panel data and the G7 countries. *Economics Letters*, 83, 185-191.
- Ashra, Sunil. (2002). Inflation and openness: A study of selected developing economies. Working Paper, No. 84, 1-32.
- Badinger, Harald. (2009). Globalization, the output-inflation trade off and inflation. *European Economic Review*, 53, 888-907.
- Baltagi, Badi H. (2005). *Econometric Analysis of Panel Data*. John Wiley & Sons, Ltd Third Edition.
- Breitung, J. (2000). The local power of some unit root tests for panel data. *Advances in Econometrics*, 15, 161–177.
- Choi I. (2001). Unit root tests for panel data. *Journal of International Money and Finance*, 20, 249-272.
- Dickey DA, Fuller WA. (1979). Distribution of the Estimators for Autoregressive Time Series with a Unit Root. *Journal of the American Statistical Association*, 74, 427–431.
- Dickey DA, Fuller WA. (1981). Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root. *Econometrica*, 49, 1057–1072.
- Gokal, V & Hanif, S. (2004). Relationship Between Inflation and Economic Growth, Working Paper.
- Han, Song & Mulligan, Casey. B. (2001). Inflation and Size of Government,
- Harris, R. D. F., Tzavalis, E. (1999). Inference for unit roots in dynamic panels where the time dimension is fixed. *Journal of Econometrics*, 91, 201-226.
- Im, K. S., Pesaran, M. H., Shin, Y. (2003). Testing for unit roots in heterogeneous panels. *Journal of Econometrics*, 115(1), 53-74.
- Iyoha, Milton A. (1973). Inflation and openness in less developed economies: A cross country analysis. *Economic development and cultural change*, 22(1), 31-38.

- Jin, Jang C. (2006). Can openness be an engine of sustained high growth rates and inflation? Evidence from Japan and Korea. *International Review of Economics and Finance*, 15, 228-240.
- Jafarisamimi, Ahmad & et.al. (2012). Openness and inflation: New empirical panel data evidence. *Economics Letters*, 117, 573-577.
- Kao, C. (1999). Spurious regression and residual-based tests for cointegration in panel data. *Journal of Econometrics*, 90, 1-44.
- Kao, C., Chiang, M. H. (2000). On the estimation and inference of a cointegrated regression in panel data. *Advances in Econometrics*, 15, 179–222.
- Kim, Min kyoung & Hamid Beladi. (2005). Is Free Trade Deflationary?. *Economics Letters*, 89, 343-349.
- KOF Swiss Economic Institute. (2012). KOF Index of Globalization.
- Lane, Philip R. (1997). Inflation in open economies. *Journal of International Economics*, 42, 327-347.
- Levin A, Lin CF. (1993). Unit Root Tests in Panel Data: Asymptotic and Finite Sample Properties. Working paper. University of California, San Diego.
- Levin, A., C. F., Lin, and C. S. J. Chu. (2002). Unit-root test in panel data: asymptotic and finite sample properties. *Journal of Econometrics*, 108, 1-24.
- Maddala GS, Wu S. (1999). A comparative study of unit root tests with panel data and a new simple test. *Oxford Bulletin of Economics and Statistics*, 61, 631-652.
- Pedroni, P. (1999). Critical values for cointegration tests in heterogeneous panels with multiple regressors. *Oxford Bulletin of Economics and Statistics*, 61, 653–678.
- Pedroni, P. (2004). Panel cointegration: asymptotic and finite sample properties of pooled time series tests with an application to the PPP hypothesis. *Econometric Theory*, 20, 597–625.
- Rogoff, Keneth. (2003). Globalization and Global Disinflation, International Monetary Fund.
- Romer, David. (1993). Openness and inflation: Theory and Evidence. *Quarterly Journal of Economics*, CVIII(4), 869- 903.

- Sachsida, Adolfo & et.al. (2003). Does greater trade openness reduce inflation. Further evidence using panel data techniques. *Economics letter*, 81, 315-319.
- Unger, M., Ziberfarb, B. (1993). Inflation and its unpredictability- Theory and empirical evidence. *Journal of Money, Credit and Banking*, 25, 709-720.