INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN BUSINESS & SOCIAL SCIENCES

11, Issue 11, (2021) E-ISSN: 2222-6990

Determinants of Inflation in Selected Asian Countries

Nor Jana Salim[1], Ngo Kea Leng[2], Mohd Husnin Mat Yusof[1], Hasyaniza Yahya[3], Marini Mamat[4]

[1]Faculty of Business and Management, Universiti Teknologi MARA Cawangan Terengganu Kampus Kuala Terengganu, 20800 Kuala Terengganu, Terengganu, Malaysia, [2]Academy of Language Studies, Universiti Teknologi MARA Cawangan Terengganu Kampus Kuala Terengganu, 20800 Kuala Terengganu, Terengganu, Malaysia, [3]Faculty of Accounting, Universiti Teknologi MARA Cawangan Terengganu Kampus Dungun, 23000 Dungun, Terengganu, Malaysia, [4]Faculty of Accounting, Universiti Teknologi MARA Cawangan Terengganu Kampus Kuala Terengganu, 20800 Kuala Terengganu, Malaysia

Email: norja049@uitm.edu.my

To Link this Article: http://dx.doi.org/10.6007/IJARBSS/v11-i11/11278 DOI:10.6007/IJARBSS/v11-i11/11278

Published Date: 28 November 2021

Abstract

Inflation is considered as one of the sensitive macroeconomic phenomena in this present economy. This paper is aimed to examine the determinants of inflation in these 10 selected Asian countries namely, Bangladesh, Hong Kong, India, Indonesia, Korea, Malaysia, Philippines, Sri Lanka, Thailand and Vietnam for the period of 2006 until 2015. The results are obtained through panel data fixed effect model regression. Inflation is used as a dependent variable which is measured by consumer price index (CPI) whereas the selected independent variables are interest rate (IR), gross domestic product (GDP), money supply (MS) and public expenditure (PE). The results indicate that IR and MS are significant and negatively related to inflation. However, money supply is found to be the most salient factor to determine inflation rate in these selected Asian countries as 1% increase in money supply will decrease inflation by 2.40% while 1% increase in interest rate reduces inflation by 0.46%.

Keywords: Fixed Effect Model (FEM), Consumer Price Index, Interest Rate, Money Supply, Public Expenditure

Introduction

Over the last three decades, inflation has become a global phenomenon. The highest world inflation was recorded 16% (1980's) and 15% (1990's). In 1970's industrialized countries recorded 9% while developing countries recorded an alarming inflation of 37% (Al Shamary & Al Sabaey, 2012). High inflation emerges a major risk to Asia's macroeconomic outlook during 2007- 2008 such as the slow down of economic growth, the contraction of foreign trade and

also the fall in equity price (Goldstein, 2015). The surge of inflation was interrupted in 2009 when both the producer and the consumer price fall noticeably especially in Singapore, Malaysia, Thailand and People's Republic of China (PRC). The reason behind it is the fall in the price of global commodity. Exports and industrial production have increased again, financial pressures have eased, confidence restored. Despite the revived of Asia's economy in February 2009, inflation rose again in 2010 until the first quarter of 2011. Most of the Asian modern economies can maintain high and rapid economic growth even though there is an increase in inflation rate, however some countries encountered bad economic condition because of the uncontrollable inflation rate. According to Deyshappriya (2014), some economies are handling this issue quite well while others are running from bad to worse. On the other hand, inflation is a continuous issue that creates instability in economic growth in Sri Lanka, Philippines and Vietnam.

This study is conducted with the purpose to investigate the determinants of inflation in these 10 selected Asian countries. The two objectives of this study are

1. to explore determinants of inflation in these selected Asian Countries and
2. to determine the most influential selected determinants of inflation in these countries.

Literature Review

Interest Rate and Inflation

Ayub et al. (2014) conducted a study on the relationship between inflation and nominal interest rate in Pakistan. They employed time series data from 1973 until 2010 and co-integration techniques of Johansen and Engle-Granger.The results stated the existence of a long run relationship between the nominal interest rate and inflation. Asgharpur et al. (2014) studied the same relationship using new causality model and panel data for 40 selected Islamic countries starting from 2002 until 2005. They found that interest rate has negative relationship with inflation. Umoru and Oseme (2013) also found that the variation in interest rate on inflation was negatively related when he estimated the relationship between both variables in Nigeria using the Generalized Method of Moment (GMM) estimator.

Gross domestic product and inflation

A study in Bangladesh by Alam (2018) found that gross domestic product is a source of CPI Inflation. Analysis using Johansen Cointegration technique and the associated VECM on a set of annually data series from year 1980 t0 year 2016 GDP is positively related to Inflation. A study in Kenya by Ochieng et al. (2016) revealed that there is an inverse relationship between GDP growth and inflations applying explanatory research design approach. In line with the study done by Deyshappriya (2014) in Sri Lanka over the period of 1983 to 2010, both Johansen co-integration test and VECM method came to the same conclusion. In Iran, Alavinasab (2014) applied the Error Correction Model, while Armesh (2010) applied Ordinary Least Squares (OLS) over a period of 1961 to 2005. Both studies revealed that the GDP has negative influence on inflation rate.

Money supply and inflation

Adayleh (2018) found Money Supply is positively significant to inflation in Jordanian Economy when he applies Fully Modified OLS (FMOLS) using a quarterly data of 2000:1 t0 2017:4. Previously, t here is a consistence result of negative relationship between money supply and inflation with different techniques applied. In Tanzania, Mbongo et al (2014) applied OLS, VAR and ECM technique. Inam (2014) investigated the relationship between real money supply

and inflation in Nigeria for the period of 1970 to 2011 using multivariate co-integration regression. Ashwani (2014) also supported the negative relationship between money supply and inflation in his study in India from the data he gathered from 1981 until 2011 using co-integration error correction model. Another consistent result on the relationship was found by Akinbobola (2012) in Nigeria applying Vector Error Correction Mechanism (VECM) on a data set from 1986 to 2008. Earlier, Ramady (2009) found the same result when examining the factors determine inflation in Saudi Arabia applying correlation and regression analysis using annual data based on time series from the period 1986 to 2007.

Public Expenditure and Inflation

Ojarikre et al. (2015) did a study on the relationship between public expenditure and inflation in Nigeria using Johansen co-integration test & Granger causality; however, there is no statistical evidence. Nguyen (2014) applied co-integration &VECM in his study on Asian emerging economis for the period from 1970 to 2010 and found a positive relationship between the two variables. Ahmed et al (2013) carried out a research on the factors of inflation in Pakistan using Johansen co-integration on annual data from 1971 to 2012. The result highlighted current government expenditure contributed positively to inflation. Arif and Ali (2012) conducted a study in Bangladesh to see the relationship between public expenditure and inflation. Applying Johansen-Juselius co-integration on the data from 1978 to 2010 they found a positive relationship between the variables. Prior to that Bashir et al (2011) also revealed that in the long run high public expenditure raised the consumer price index in Pakistan using Johansen co-integration and Vector Error Correction model for the data from 1972 to 2010.

Methodology

This study uses a set of panel data for a period from year 2006 until year 2015 consists of one independent variable which is inflation measured by consumer price index and four dependent variables namely the interest rate, gross domestic product, money supply and public expenditure. All yearly data were extracted from the World Bank, journals and related articles. Due to limitation of data this study covers only ten Asian countries which are Bangladesh, Hong Kong, India, Indonesia, Korea, Malaysia, Philippines, Sri Lanka, Thailand and Vietnam. Panel data estimation model are used which include pooled ordinary least square (POLS), Breush-Pagan, Random Effect Model, Hausman Fixed test and Fixed Effect Model. All the data are transformed into natural log model and they are regressed using Stata 10.1.
The logarithm equation is written as follows:

$$\ln(CPI)_{i,t} = \alpha + \beta_1 \ln(IR)_{i,t} + \beta_2 \ln(GDP)_{i,t} + \beta_3 \ln(MS)_{i,t} + \beta_4 \ln(PE)_{i,t} + u_{i,t}$$

Where;

- ln = natural log of the variable
- i = the number of country
- t = the number of the years
- α = constant value
- $u_{i,t}$ = random error term
- CPI = Consumer Price Index
- IR = Interest Rate
- GDP = Gross Domestic Product
- MS = Money Supply

PE = Public expenditure

Results and Discussion

The Co-Variance (CV) is Standard Deviation/Mean describes the dispersion of the variables. The higher the CV the higher is the dispersion in the variable and vice versa. As reported in Table 1, Money supply has the lowest CV which is 0.1377% which means it has less variability and thus generates higher consistency and stability.

Table 1
Descriptive Statistics

Stats	lgcpi	lgir	lggdp	lgms	lgpe
min	- .5447272	- 0512933	- 1.469676	3.484619	1.61746
max	3.140698	2.36368	2.169054	5.894568	2.868467
mean	1.486487	1.329976	1.346168	4.48779	2.285192
CV	.5065512	.4040791	.4647596	.1377449	.1567175
Variance	.5669818	.2888153	.3914308	.3821343	.1282568

Correlation Results in Table 2 shows the relationship between all the independent variables and the CPI. GDP has a positive relationship with CPI while the other three variables; IR, MS and PE have negative relationship with CPI. Regardless of the positive or negative sign MS has the strongest relationship with CPI due to the highest value of correlation which is 0.4687. None of the correlation value exceeds 0.8 which means there is no multicollinearity exists among the variables.

Table 2:
Correlation Results

Independent Variables	Result
IR	-0.1212
GDP	0.2404
MS	-0.4687
PE	-0.3733

The value of R^2 in Table 3 which is 0.3633 indicating that almost 36% of the variation in the CPI can be explained by the variation in the independent variables (IR, GDP, MS and PE) while the remaining is unexplained due to randomness. Probability t-test shows that IR, MS and PE are significant at 1% with all of them have negative relationship with CPI. The coefficient values show that any 1% increase in interest rate, money supply and public expenditure will decrease inflation rate by 0.4%, 0.5% and 0.6% respectively.

Table 3
Pooled Ordinary Least Square (POLS) Regression

Source	**SS**	**df**	**MS**	No of obs = 86		
Model	15.4616226	4	3.86540566	F(4,81 = 12.12		
Residual	23.8566211	81	.294526186	Prob > F = 0.0000		
Total	39.3182437	85	.462567573	R-squared = 0.3932		
				Adj R-squared = 0.3633		
				Root MSE = .5427		
lgcpi	**Coef.**	**Std.Err.**	**t**	**P> [t]**	**(95% Conf. Interval)**	
lgir	-0.3976667	.1169572	-3.40	0.001	-0.6303748	-.1649586
lggdp	.0593604	.1027862	0.58	0.565	-.145152	.2638728
lgms	-.5301175	.103847	-5.10	0.000	-.7367405	-.324945
lgpe	-.5789626	.1708204	-3.39	0.001	-.9188416	-.2390837
_cons__	5.616411	.6915706	8.12	0.000	4.240402	6.992419

Table 4
Breush and Pagan Langrangian Multiplier test

	Var	sd = sqrt(Var)
Lgcpi	.4625676	.6801232
e	.1840205	.4289761
u	.0845714	.2908116

Test: Var (u) = 0
Chi2(1) = 13.41
Prob > chi2 = 0.0003

Breush and Pagan test is to decide whether to use POLS or panel data analysis (PDA) for further analysis. In Table 4, the probability value of chi2 is 0.0003 which is less than 0.05 supports the rejection of the null hypothesis and this study can proceed to Random Effect Model (REM).

Table 5
Random Effect Model

Group variable: code			Number of obs = 86			
R-sq: within = 0.2921			Number of group = 10			
Overall = 0.3463			Obs per group min = 6			
Between = 0.3463			Avr = 8.6			
Overall = 0,3463			Max = 10			
Random effects u_i ~			Wald chi2(4) = 35.37			
GaussianCorr (u_i, x) **= 0**			**Prob > chi2 = 0.000**			
lgcpi	**Coef.**	**Std.Err.**	**z**	**P> [z]**	**(95% Conf. Interval)**	
lgir	-.467399	.1050955	-4.45	0.000	-.6733823	-.2614156
lggdp	.0144477	.0927675	0.16	0.876	-.1673733	.1962686
lgms	-.7349627	.1814673	-4.05	0.000	-1.090632	-.3792933
lgpe	-.2367213	.2652753	-0.89	0.372	-.7566515	.2832088
_cons__	5.898628	1.027801	5.74	0.000	3.884175	7.913081
Sigma_u	.29081159					
Sigma _e	.42897608					
rho	.31486948 (fraction of variance due to u_i)					

Random Effect Model (REM) in Table 5 shows the value of overall R-squared is 0.3463. It means 34.63% of the variation in the independent variables explains the dependent variable, while the remaining of 65.37% is unable to explain due to unknown variables. Only IR and MS are significant at 1% level since the probability of z-value is less than 0.01. They are also negatively related to CPI where, 1% increase in interest rate and money supply will decrease inflation by 0.4674% and 0.735% respectively.

Hausman Fixed test is conducted to choose either Random Effect Model or Fixed Effect Model for the study. The significant value of probability chi2 in Table 6 which is 0.0018 rejects the null hypothesis successfully hence the analysis proceeds with Fixed Effect Model (FEM) regression.

Table 6

Hausman Fixed test

	(b) fixed	(B) .	(b-B) Difference	Sqrt(diag(V-b-V_B))
lgir	-.4566832	-.467399	.0107158	.
lggdp	-.0530773	.0144477	-.067525	.
lgms	-2.397054	-.7349627	-1.662091	.5117471
lgpe	.3275982	-.2367213	.5643195	.2796921

b = consistent under H_0 and H_a; obtained from xtreg

B = inconsistent under H_a, efficient under H_0; obtained from xtreg

Test: H_0: difference in coefficients not systematic

Chi2(4) = (B-b)' [(V_b -V_B)^(-1)] (b-B)

= 17.19

Prob>chi2 = 0.0018

(V_b -V_) is not positive definite)

Table 7

Fixed Effect Model

Group variable: code R-sq: within = 0.3934 Between = 0.3355 Overall = 0.2274 **Corr (u_i, xb) = -.9244**			Number of obs = 86 Number of group = 10 Obs per group min = 6 Avr = 8.6 Max = 10 F(4,72) = 11.62 **Prob>F = 0.000**			
lgcpi	**Coef.**	**Std.Err.**	**t**	**P> [t]**	**(95% Conf. Interval)**	
lgir	-.4566832	.0988338	-4.62	0.000	-.6537041	-.2596623
lggdp	-.0530773	.0887413	-0.60	0.552	-.2299798	.1238252
lgms	-2.397054	.5429691	-4.41	0.000	-3.479443	-1.314664
lgpe	.3275984	.385485	0.85	0.398	-.4408521	1.096048
_cons__	12.14869	2.692964	4.51	0.000	6.780363	17.51701
Sigma_u Sigma_e rho	1.220061619 .42897608 .8899759 (fraction of variance due to u_i)					

Fixed Effect Model (FEM) regression in Table 7 shows that the overall value of R-squared is 0.2274. It means 22.74% variation of CPI can be described by all the independent variables, while the remaining 77.26% is unable to define due to unknown variables. Only two variables which are IR and MS are significant at 1%. Both IR and MS have negative relationship with CPI which indicates that, 1% decrease in IR and MS will increase inflation rate by 0.46% and 2.40% respectively. Although PE remains insignificant it is positively related to CPI.

Conclusion

Based on the fixed effect model (FEM) regression this study suggests that interest rate and money supply are significant at 1% level in determining the inflation with negative relationship. Money supply is the most important factor as 1% increase in money supply will decrease inflation by 2.40%. This is consistent with the studies done by Inam (2014); Ramady (2009); Ashwani (2014).

However, increasing in the money supply is faster than the growth in real output will cause inflation because more money chasing for the same number of goods. If the real output growth is the same as increase in money supply it will not lead to inflation because the increase in money supply is absorbed by the increase in the real output. This is also explained in the Keynesian view of liquidity trap where the interest rates fall to a certain level because everyone prefers holding cash rather than debt making monetary policy ineffective. In other words, increase in Ms will not stimulate spending therefore price will go down.

While, 1% increases in interest rate will decrease only 0.46% of inflation. In general, as interest rates are lowered, people are able to borrow more money. The result is consumers have more money to spend, causing the economy to grow and yet inflation increase. However, the rising interest rate caused consumers to keep money in the bank as returns from savings are higher. With less disposable income being spent, the economy slows and inflation decreases. Many previous studies supported the significant negative relationship between interest rate and inflation as revealed by Umoru and Oseme (2013); Asgharpur et al (2014); Backman (2011); Ayub et al. (2014). These findings suggest that monetary policy namely the money supply and interest rate is an effective policy to control inflation. However, it should be noticed that inflation is a relative not an absolute. From the result of analysis, the modified logarithm equation is written as below:

$$ln(CPI)_{i,t} = 12.14869 - 0.4566832 ln(IR)_{i,t-1} - 2.397054 ln(MS)_{i,t-1} + u_{i,t}$$

It is recommended that future researchers should enlarge the scope of study by adding more data and adding other determinants of inflation to get more robust findings. Similar study can also be conducted by comparing determinants of inflation among different countries.

References

Adayleh, R. M. (2018). Determinants of Inflation in Jordanian Economy. Journals of Internet Banking and Commerce, 23(2), 1-19.

Ahmad, F., Raza, H., Hussain, A., & Lai, I. (2013). Determinants of Inflation in Pakistan: An econometric analysis, using Johansen co integration approach. European Journals of Business and Management, 5(30), 115-122.

Akinbobola, T. O. (2012). The Dynamics of Money Supply, Exchange Rate and Inflation in Nigeria. Journal of Applied Finance and Banking, 2(4), 117-141.

Alavinasab, S. M. (2014). Determinants of Inflation: The Case of Iran. International Journal of Social Science and Management, 1(1), 71-77.

Al-Shammari, N., & Al-Sabaey, M. (2012). Inflation Sources Across Developed and Developing Countries; Panel Approach. International Business & Economics Research Journal, 11(2), 185-194.

Arif, K. M., & Ali, M. M. (2012). Determinants of Inflation in Bangladesh: An Empirical Investigation. Journal of Economics and Sustainable Development, 3(12), 9-17.

Armesh, H., Salarzehi, H., Yaghoobi, N. M., & Heydari, A. (2010). Causes of Inflation in the Iranian Economy. International Review of Business Research Papers, 6(3), 30-44.

Asgharpur, H., Kohnehshahri, L. A., & Karami, A. (2014). The Relationship Between Interest Rates and Inflation Changes: An Analysis of Long-Term Interest Rate Dynamics in Developing Countries. University of Tabriz.

Ashwani. (2014). Determinants of Inflation in India: A Co-Integration Approach. International Journal of Multidisciplinary Consortium, 1(1), 1-11.

Ayub, G., Rehman, N. U., Iqbal, M., Zaman, Q., & Atif, M. (2014). Relationship between Inflation and Interest Rate: Evidence from Pakistan. Research Journal of Recent Sciences, 3(4), 51-55.

Backman, T. (2011). Commodity Prices and Interest Rates: The Euro Zone. Master thesis, Sweden: Lund University.

Bashir, F., Nawaz, S., Yasin, K., Khursheed, U., Khan, J., & Qureshi, M. J. (2011). Determinants of Inflation in Pakistan: An Econometric Analysis Using Johansen Co-Intergation Approach. Australian Journal of Business and Management Research, 1(5), 71-82.

Deyshappriya, N. P. R. (2014). Inflation Dynamics in Sri Lanka: An Application of VECM Approach. Ruhuna Journal of Management and Finance, 1(2), 17-28.

Gokal, V., & Hanif, S. (2004). Relationship between inflation and economic growth (Vol. 4). Suva: Economics Department, Reserve Bank of Fiji.

Inam, U. S. (2014). An Empirical Investigation of the Relationship between Money Supply and Inflation in Nigeria (1970-2011). International Journal of Humanities Social Sciences and Education, 1(12), 65-76.

Jongwanich, J., Wongcharoen, P., & Park, D. (2016). Determinants of Consumer Price Inflation versus Producer Price Inflation in Asia. ADB Economics Working Paper Series, pp. 1-30.

Mbongo, J. E., Mutasa, F., & Msigwa, R. E. (2014). The Effects of Money Supply on Inflation in Tanzania. Science Publishing Group, 3(2), 19-26.

Mohammad, M. A. (2018). The Determinants of CPI Inflation in Bangladesh, 1980-2016. Asian Journal of Economic Modelling, 6(4), 441- 461.

Ochieng, O., Mukras, M. S., & Momanyi, G. (2016). The Determinants of Inflation in the Kenyan Economy. International Journal of Economics, 1(1), 46-60.

Ojarikre, O. O., Ezie, O. (2015). Public Expenditure Growth and Inflation in Nigeria: The Causality Approach. SSRG International Journal of Economics and Management Studies, 2(1).

Ramady, M. A. (2009). External and Internal Determinants of Inflation: A Case Study of Saudi Arabia. Middle East Journal of Economics and Finance, 2(1-2), 25-38.

Umoru, D., & Oseme, A. S. (2013). Inflation Expectations and Interest Rate Variation in Nigeria: An Econometric Assessment of the Evidence. International Journal of Development and Economic Sustainability, 1(2), 1-12.