Do Inflation and Its Volatility Impact on Economic Growth Rate In Myanmar?

SI THU KYAW

ABSTRACT

The aim of this paper is to examine the volatility of inflation and impacts of inflation on economic growth of Myanmar using the yearly data over the period of 1980 to 2014. Inflation volatility is estimated by developing ARMA (2, 2)-GARCH (1, 1) model which is the fitted model for forecasting inflation volatility according to AIC and SIC values and Engle and Granger co-integration is used to estimate the long run relationship between inflation, inflation volatility, higher and lower inflation and economic growth rate. Finally, the empirical results examine that inflation volatility is forecasted by ARMA (2, 2)-GARCH (1, 1) model and there is inflation volatility in Myanmar economy. The inflation volatility positively influences on economic growth rate. The results suggest that inflation volatility and economic growth rate have long run relationship and co-integration.

Keywords: Economic growth, ARMA, GARCH, Inflation, Co-integration, Forecasting
JEL Classification: E310, E370, C220

1. Introduction

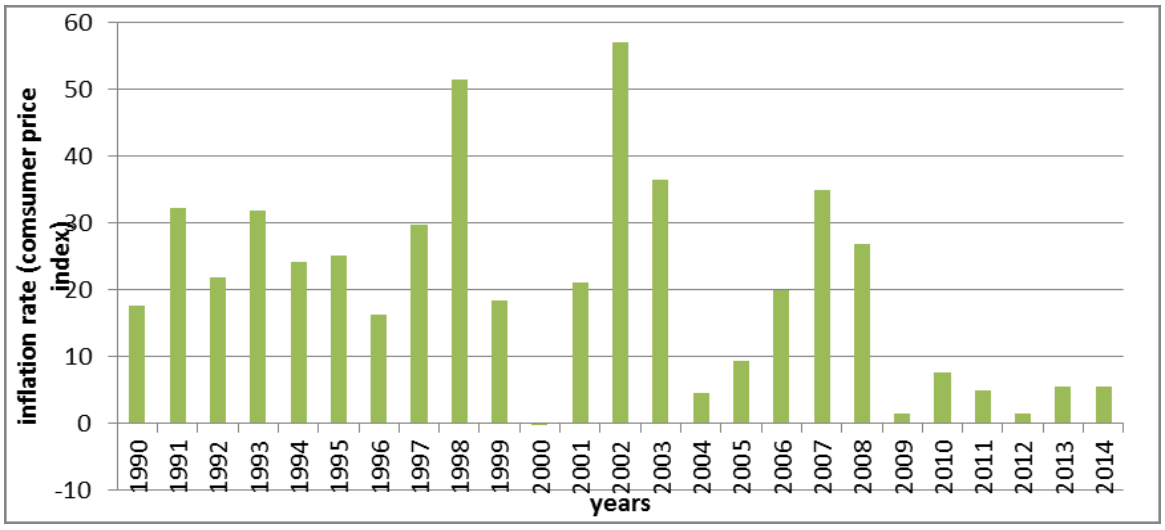
Inflation has become one of the key problems in the developing countries since the early twenty first century so both policymakers and academicians have been studying this issue. Most of the developing countries have been attempting to achieve sustainable economic growth in order to enhance the welfare and its citizenry. Therefore, they consider that there is the relationship between inflation, inflation volatility and economic growth. As Myanmar is the developing country, Myanmar government in 1962 has been attempting to enhance economic growth but there were mismanagements of economic agents when socialist economy was practiced.

From 1960 to 1988, Myanmar adopted 'the Burmese Way to Socialism'; a variation of central planning economic system so economy was isolated from international economy. After more than two decade, since 1988, market oriented system have been introduced to economy. In the 1989-90, the rice price had raised because the liberalization of domestic rice market and these result lead to dynamic inflation (Fujita and Okamoto 2006). From this period, the inflation has

been a core circumstance for the economy and a critical cause of the existing economic problems. The long-lasting high inflation and fiscal deficit because of monetization of fiscal deficit have been deep-rooted problems in Myanmar. In early 2000's monetization of fiscal deficit as a percentage of GDP averaged four percent.

As Burma economic review (2005-2006) written by Sein Htay, the actual CPI inflation data is higher than the official released by SPCD consumer price index which is centered on unreliable lower income basket of goods selected in 1985/86 and do not include imported goods and gives a very low weighting to staple, containing rice, oil, meat, etc…. Budget deficit was the main source of inflation and other factors leading to inflationary process were over-bidding of agriculture sector export, over building of certain infrastructure facilities, depreciation of kyat.

In Myanmar, Kyat is the national currency. The inflation in the 1990s averaged around 25% per year. Between 1990 and 1997, Myanmar inflation rate was running with the annual percentage of 15 and 30. However, there was 51% in 1998 and reduced in 1999 to 18.4%. The highest rate of inflation was 58% in 2002 and the lowest inflation rate was -0.11 in 2000. After 2002, it reduced almost the half of its inflation to 36.7% in 2003. Then inflation rate was slowly increasing to 2007. The average inflation between 2005 and 2007 was about 30.01% and inflation in 2008 was 26.8%. Excess supply of money of money is the main problem for high inflation in Myanmar. Therefore, the annual inflation rate in Myanmar was over 25 percent in 2007-2008. (See in figure 1)



Sources: World Bank data

Figure 0-1: Annual Inflation Rate in Myanmar (1990-2014)

According to World Bank Report on Myanmar, ending poverty and boosting shared prosperity in a time of transaction (2014) inflation declined significantly in 2013/14 from 22.5% in 2008/09 to 5.7% due to government policy improved which is keeping fiscal deficit below 5% of GDP. In addition, an important policy moves in the financing of the fiscal deficit from dependence on the printing money to better use of treasury bonds. The exchange rate management has also developed significantly next the floating exchange rate on April 1, 2012.

Myint, U. (2012) pointed out that high money supply (M_2) growth to finance budget deficits is believed to be the main cause of inflationary pressures in Myanmar. According to official statistics, the rate of M_2 growth averaged 28% over the period of 2000 to 2008 in table 3. There were four others inflationary pressure in Myanmar since 2004. These included rising of official gasoline and diesel prices by 700% in October 2005, shift of capital to Nay Pyi Taw in

November 2005, upward adjustment of public employees by 500% for low level employees and over 1,200% for top official beginning in April 2006 and Cyclone Nargis in May 2008.

Table 0-1: Impact of money supply on Inflation of Myanmar

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Money supply rate	47.4	43.2	18.4	11	32.4	26	27.2	30	21.2
Inflation rate	-1.6	34.6	58	26.8	12	9	26.3	26.1	33.3

Notes: M2 "broad money" consists of currency, current and saving accounts and time deposits. Economies have been listed in ascending order of average rate of money supply growth for the period 2000–2008.
Sources: ESCAP, Economic and Social Survey of Asia and the Pacific 2006 and 2009 (New York: United Nations, On-line Edition); Ministry of National Planning and Economic Development, Yangon and Nay Pyi Taw.

As most developing countries, Budget deficit is the main cause of inflation in Myanmar. The state expenditure is far exceeding the increases taxation revenue so the state finances it is spending by making printing money. The result of signor-age is the fact of inflation in Myanmar. Therefore, the study aims to examine the inflation volatility of Myanmar and its impact on economic growth.

2. Literature review

Empirical literature explained about the relationship between inflation and inflation uncertainty and mixed results are reported. Brunner and Hess (1993) and Grier and Perry (1998) used the ARCH and GARCH models technique for G 7 countries and the evidence supported the Friedman and Ball hypothesis. However, the study found a weakness of Cukierman and Meltzer hypothesis.

Kontonokas, A. (2004) studied inflation and inflation uncertainty in United Kingdom using the estimated conditional volatility from symmetric, asymmetric, and component GARCH-M models and the positive relation between inflation and inflation uncertainty providing Friedman-Ball hypothesis. The study used monthly and quarterly data from 1972 to 2002 to estimate inflation. In unit root testing, PP and ADF teat the data are stationary at all levels. It speared two periods before and after inflation targeting (IT). With monthly and quarterly data Chow F-statistic for breakpoint in October 1992 1% level significant for monthly and failed to identify with quarterly data. That is the result mean Autoregressive model is unsatisfied with no dummy. After taking dummy variables two main advantages found that first, improve fit and a decade of IT period in UK had negative effect, applied Wald test-statistic. Using Autoregressive model (AR) it rejected null hypothesis that mean there is no homoscedasticity. According to GARCH-M model there is strong positive link between current inflation volatility and past inflation. In GARCH (1, 1) model, one period lag of inflation coefficient is positive and statistically significant and agreed to Friedman-Ball. With quarterly data threshold GARCH model examined the asymmetric effect is negative that is good news on inflation. GARCH (1, 1)-M and TGARCH (1, 1)-M model explained inflation uncertainty was lower during the IT period.

Moradi, M. A. (2006) investigated the Iran inflation by using ARCH and GARCH models to examine bi-directional causality between inflation uncertainty and inflation. In the study threshold GARCH (TGARCH) and component GARCH (CGARCH) models was applied to analysis the effect of inflation. It speared two periods 1959:03 to 1972:07 and 1972:08 to

2008:02. In the first period, inflation situation have been lower and the second period of inflationary regime have volatile. This is the sign of heteroskedastic. Therefore, GARCH modeling method was applied to study. The Engle test in AR (60) model for whole period and AR (24) model for first period explained there had ARCH effect over the whole period and however the first period test only could not find ARCH effect. GARCH (1, 1) model result explained there were positive relationship inflation and its variability, which means inflation, raised inflation uncertainty. In the TGARCH model, the existence of negative sing on asymmetric parameter is good news and positive is bad news. In both the period, the results confirmed there was the presence of long memory in the conditional variance. Thornton (2007) employed in 12 emerging markets' the relationship between inflation and inflation uncertainty by using a standard GARCH(q,v) model and the results were strongly support to Friedman hypothesis in all countries economy. Using the two-step methodology, Karahan, O (2012) studied that the first test, a conditional variance in an ARMA-GARCH model, estimated inflation uncertainty and Granger causality test was applied in second covered the period from 2002M1 to 2011M1. The results provided Friedman-Ball hypothesis.

Oten-Abayie, E. f., & Doe, S .K. (2013) paper supported Cukierman and Meltzer hypothesis which inflation uncertainty raises inflation using two approaches, GARCH-in-Mean and two-step Granger causality. Used monthly inflation data, Barimah, A and Amuakwa-Mensah, F studied Ghana economy inflation by using AR (3)-GARCH (1, 2)-M model and Granger causality test over the period of 1964:04-2012:12. First, the study found that inflation significantly raises inflation uncertainty as predicted by Friedman hypothesis. In the long- run, the result provided Cukierman and Meltzer hypothesis.

Sharaf, M. F. (2015) studied the title of inflation and inflation uncertainty revisited: evidence from Egypt using various version of the GARCH-M model. In the study Granger-causality and asymmetric GARDH-M, EGARCH-M and TGARCH-M models informed a positively and statistically significant, two-way link between inflation uncertainty and inflation, confirming the Friedmand-Ball and Chuierman-Meltzer hypothesis. Fountas (2000), Crawford (1996), Samimi and Motmeni (2009), Farshid and Mojtaba (2010) and Heidari and Bashiri (2010) found that the period of higher inflation lead to higher inflation uncertainty in the various countries confirming the theoretical predictions made by Friedman.

Popkarn Arwatchanankarn (2015) studied inflation and inflation volatility in Thailand using GARCH model technique that the test supported Friedman-Ball hypothesis that the inflation raises inflation volatility in Thailand. It suggested that a rise in inflation volatile lead to be lower the inflation as anticipated by Holland. In this study autoregressive model AR (p) was not satisfied there is homoscedastic and rejects null-hypothesis. The results of GARCH (1, 1), TGARCH (1, 1) and EGARCH (1, 1) models informed to support Friedman-Ball hypothesis. The standardized residuals and correlogram shows there is no serial correlation. The null hypothesis of no Granger-cause inflation is rejected and in TGARCH (1, 1) and EGARCH (1, 1). Then, it-supported Holland's stabilization hypothesis the higher rate of inflation raises the inflation volatility. Granger test for inflation volatility and economic growth informed inflation volatility is to lower economic growth on the period from 1994q1 to 2013q4.

3. Methodology

This paper used ARMA(p,q)-GARCH(m,r) model to forecast the inflation and Engle and Granger co-integration model applied to test the impacts of inflation, inflation volatility and high and low inflation on gross domestic product growth rate.

3.1 Autoregressive Moving Average model

The forecasting method of Autoregressive Moving Average model or ARMA (p, q) model has been the method that forecast the stationary time series. The ARMA (p, q) model can be written as equation (1) in the form as follow:

$$y_t = c + \sum_{i=1}^{p} \emptyset\, y_{t-i} + \sum_{j=1}^{q} \theta_j \epsilon_{t-j} + \epsilon_t \quad (1)$$

Where, y_t= the time series needed to be model

c = constant

p = the number of autoregressive orders

q= the number of moving average orders

$\emptyset$ = autoregressive coefficient

θ = Moving average coefficient

ϵ = the error term

3.2 The GARCH (m, r) model of inflation

The mean inflation equation is developed to incorporate the existence of the time varying in the residuals to build a measure of inflation uncertainty using ARMA-GARCH model in the following equations:

$$\pi_t = \alpha_0 + \sum_{t=1}^{p} \alpha_i \pi_{t-p} + \sum_{j=1}^{q} \theta_n \epsilon_{t-j} + \varepsilon_t \quad (2)$$

$$\sigma_t^2 = \beta_o + \sum_{q=1}^{r} \beta_q\, \epsilon_{t-q}^2 + \sum_{v=1}^{s} \delta_v \sigma_{t-v}^2 \quad (3)$$

In the above equation, the rate of inflation measured by Consumer Price Index percentage changing (CPI) and a random error term is ε_t. Autoregressive process with p-th order represents inflation. $\sum_{j=1}^{q} \epsilon_{t-j}$ is moving average term in equation (2), mean equation. The variance equation (3), the time varying conditional variance of inflation, is dependent upon the ARCH term that is the distributed lag of square residuals derived from mean equation, GARCH term distributed lag of forested variance of past periods and the inflation rate.

3.3 Engle and Granger co-integration model

The Engle and Granger co-integration test will be used to estimate any link the rate of inflation, inflation volatility and GDP growth. To apply the model, it will regress following equations (4) and (5).

$$Y_t = \beta_0 + \beta_1 X_t + \epsilon_t$$

$$\in_t = Y_t - \beta_0 - \beta_1 X_t$$

Where, Y_t= dependent variable

β_0= constant term

β_1 = the coefficients and co-integrating parameter

X_t= independent variables

$\in_t$= error term

Then, it will estimate the equation and obtain residuals, $\in_t$. Besides, ADF unit root test will be tested to the residual. The null hypothesis is the residual have unit root and alternative hypothesis is residual is no unit root. The desired model is to reject the null hypothesis and it will be stationary. Although Y and X are individually (I_1) it will be interesting situation they own stochastic term and their linear combination is at (I_0). Then the linear combination cancels out the stochastic term in two series.

To test the co-integration the equation there will be simple method of ADF unit root test on residual estimated from the co-integration regression. If the residual is stationary Y and X variables are co-integrated and have long run relationship or equilibrium relationship between them. There is also long run model of equation (4). Testing the t-test, the coefficient of β_1 value explains the relationship between Y and X.

4. Data

The data used in the research was collected from International Financial Statistics, International Monetary Fund and World Bank. The study used yearly inflation and gross domestic product rate time series data. The high and low dummy inflation data is determined as 10 percent and its above is high and inflation volatility is created by the fitted model. Before the model forecasting and estimation the unit root test was applied to the time series data.

Table 1: Unit root test results

Variables	ADF test		PP Test	
	level	First difference	level	First difference
GDP	-1.3098	-2.9945**	-2.1763	-7.7430***
INF	-4.083***	-	-3.1660**	-

GINF	-1.948	-3.9508***	-2.0137	-2.9916**

Note: *** and ** denoted 1% and 5% level significant level, *MacKinnon (1996) one-sided p-values

According to ADF and PP unit root test variables are 5% and 1% level significant at level and first different in the table 1. We included only a constant test. The null hypothesis for both unit root tests is that the time series data have unit root. The GDP is not significant at level thus the variables took first difference. After taking the first difference to GDP, the variable became stationary at 5% level with ADF test and 1% level with PP test which reject null hypothesis of happening unit root. The GINF, inflation volatility is significant after taking first difference. At the level, the INF, inflation rate is stationary at 5% level with PP test and 1% level with ADF test. This result suggests that the time series inflation rate reject the null hypothesis that the INF is not stationary.

5. Result

5.1 ARMA (2, 2)-GARCH (1, 1) model estimation

The method of parameters estimation has been done by EViews software. Using this software, the parameter estimation of the time series inflation is obtained and shown in table 5-1.

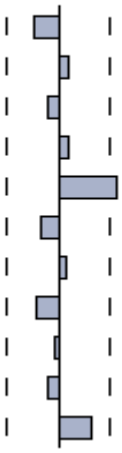
Table 5-1: ARMA (2, 2)-GARCH (1, 1) model parameters estimation

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	21.131	1.7041	12.3999	0.000
AR(1)	1.1875	0.0004	2779.1580	0.000
AR(2)	-0.3690	0.0419	-8.8082	0.000
MA(1)	-0.7730	0.0982	-7.8707	0.000
MA(2)	-0.1829	0.1089	-1.6804	0.092
Variance Equation				
C	2.7732	18.3261	0.1513	0.8797
RESID(-1)^2	-0.1948	0.1687	-1.1546	0.2482
GARCH(-1)	1.2281	0.3946	3.1117	0.0019

Source: calculated

In the table 4-3, the GARCH is significant that is the previous year inflation volatility can influences the current year inflation volatility. The normal Gaussian distribution is used in the model testing. The model is identified by testing correlogram square residual test, histogram normality test and ARCH-lm test.

The Correlogram square residual test is used to check the serial correlation in the residuals. The good sign is the residuals should be no serial correlation so there is necessary to accept the null hypothesis. The null hypothesis assumes there is no serial correlation in the residual or error term.

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
		1	-0.165	-0.165	0.9839	0.321
		2	0.094	0.069	1.3154	0.518
		3	-0.097	-0.073	1.6759	0.642
		4	0.105	0.075	2.1115	0.715
		5	0.340	0.395	6.8727	0.230
		6	-0.191	-0.118	8.4288	0.208
		7	0.136	0.061	9.2512	0.235
		8	-0.216	-0.140	11.407	0.180
		9	0.149	-0.030	12.471	0.188
		10	-0.027	-0.070	12.506	0.253
		11	0.150	0.237	13.683	0.251

Source: Calculated

Figure 5-1: Correlogram Square Residuals Rest for Inflaton

According to the test results in Figure 4-4, the PACF and ACF spikes are within the bounds. Thus, the residuals have no serial correlation and it accept the null hypothesis with Normal Gaussian distribution. The histogram normality test indicates that the null hypothesis is accepted that is why the residuals are normally distributed. The result is desired from the model. The mean value is 0.1 and the standard deviation is equal to 0.982 which indicates the residuals are normally distributed. We applied ARCH-LM test. the value of F-statistic is 0.8531 and its probability is 0.363 that accept the null hypothesis of being no ARCH effect. The result indicates that the model is the good estimator for time series inflation.

5. Engle and Granger co-integration

There are four variables to test the model which variables have co-integration or not. The fours variables are gross domestic product growth rate (GDP), inflation rate (GNF), volatility of inflation (GINF) that is created by chosen ARMA (2, 2)-GARCH (1, 1) and dummy inflation (DUMMY). The dummy inflation define that the value 10 percent and above 10 percent rate are higher rate and the value less than 10 percent is lower rate. There are two conditions to check the co-integration model. The first one is the data must be stationary at the first ordered difference. The second condition is that the residual of the OLS estimation should be stationary at level. If the residual is stationary, the model is not spurious regression model. Thus, the variables in the model are co-integrated and they have long run equilibrium relationship, which also mean the model is long run model. There is a need to test OLS estimation before the checking the variables co-integrated. The OLS estimation coefficient results are shown in Table 4.9.

Table5-2: The result of OLS estimation for Co-integration

Variable	Coefficient	Probability
C	5.1291	0.0127
INF	0.0610	0.6104
GINF	0.0267	0.0998
DUMMY	-4.5575	0.1688

Sources: calculated

According to Engle and Granger co-integration test, the R square value 0.134364 is less than the Durbin-Watson statistics 0.80767so that it is not spurious regression. Therefore, the condition is acceptable the model. In the OLS estimation, the inflation volatility, GINF is significant and the probability of GINF0.0998. The coefficient of GINF is -0.0267 that the inflation volatility and real gross domestic product have positively relation in the model. The others two variables, INF and DUMMY are not significant but DUMMY have negative impact on GDP and INF positively effects to GDP. The residuals unit root test checked by ADF unit root testing show that the residuals have no unit root. Therefore, the significant variable GINF and GDP have long run equilibrium relationship and they have co-integration in the model. According to the result, the inflation volatility positively influences to DGP growth rate. This research support to Dotsey and Sarte (2000) argue that inflation volatility can lead to increase economic growth.

Table 5-3: Residuals unit root for co-integration

ADF test	Critical values At 1%, 5% and 10% levels	T-statistics	Probability	Significant
Constant	-3.6537 -2.9571 -2.6174	-2.7565	0.0759	Stationary

Source: calculated

In the table 5-3, the residuals unit root test checked by ADF unit root testing show that the residuals have no unit root. Therefore, the significant variable GINF and GDP have long run equilibrium relationship and they have co-integration in the model. According to the result, the inflation volatility positively influences to DGP growth rate. This research support to Dotsey and Sarte (2000) argue that inflation volatility can lead to increase economic growth.

6. Concluding Remarks

This paper was started to find a suitable ARMA and ARIMA-GARCH models for forecasting inflation rate. ARMA-GARCH model is a very popular method for forecasting. According to theoretical distribution of autocorrelation, the various methods have made to select the appropriate model. This study applies four difference stages, which are model identification, model estimation, diagnostic checking and forecasting. In the present study, ARIMA (2, 2)-GARCH (1, 1) model is selected to forecast the inflation. After selecting the model to forecast the inflation data the final step have create new variable that is made by fitted model to check the co-integration with GDP growth rate. The new variable is the inflation volatility developed

by the ARIMA (2, 2)-GARCH (1, 1) model. Then, the co-integration test explain that the inflation volatility positively influence to GDP growth.

In this research, the study finds the fitted model forecast the inflation of Myanmar and investigates the impacts of inflation volatility on the economic growth. The fitted model explains the inflation is high volatile and fluctuation inflation that Myanmar needs to consider this high volatile and fluctuation rate of inflation in Myanmar. The independency of CBM is important to implement the monetary policy because of stabilization of inflation and its ability is needed to rebuild under the four independencies that are functional independence, personal independence, financial independence and prudential independence.

The next suggestion is that the inflation volatility positively affects to GDP growth rate. Therefore, Myanmar needs to consider the impact of inflation volatility on economic growth rate when they implement the policy for achievement of targeted growth rate. Myanmar needs the believable statistical data to calculate the economic growth rate to protect the impact of inflation.

REFERENCES

Asghar, A., Ahmad, K., Ullah, S., Bedi-uz-Zaman, B., & Rashid, M. T. (2011). The relationship between inflation and inflation uncertainty: A case study for Saarc Region countries. *International Research Journal of Finance and Economics*, *66*, 85-98.

Arwatchanakarn, P., & Hossain, A. A.(2015) Inflation and Inflation Volatility in Thailand.

Barimah, A., & Amuakwa-Mensah, F. DOES INFLATION UNCERTAINTY DECREASE WITH INFLATION? A GARCH MODEL OF INFLATION AND INFLATION UNCERTAINTY.

Banerjee, S. (2013). *Essays on inflation volatility* (Doctoral dissertation, Durham University).

Brunner, A. D., & Hess, G. D. (1993). Are higher levels of inflation less predictable? A state-dependent conditional heteroscedasticity approach. *Journal of Business & Economic Statistics*, *11*(2), 187-197.

Caporale, G. M., Onorante, L., & Paesani, P. (2010). Inflation and inflation uncertainty in the euro area.

Crawford, A., & Kasumovich, M. (1996). Does inflation uncertainty vary with the level of inflation?. *Available at SSRN 75354*.

Engle, R. F.. (1983). Estimates of the Variance of U. S. Inflation Based upon the ARCH Model. *Journal of Money, Credit and Banking*, *15*(3), 286–301.

Entezarkheir, M. (2006). The relation between inflation and inflation uncertainty in Iran. *Iranian Economic Review*, *11*(17), 1-20.

Friedman, M.. (1977). Nobel Lecture: Inflation and Unemployment. *Journal of Political Economy*, *85*(3), 451–472.

Fountas, S., Karanasos, M., & Karanassou, M. (2000). A GARCH model of inflation and inflation uncertainty with simultaneous feedback. *Queen Mary and Westfield College, Department of Economics Working Paper*, (414).

Gujarati, D. N. (2003). Basic Econometrics Fourth Edition McGraw Hill Gujarati, DN,(2003). Basic Econometrics.

Grier, K. B., & Perry, M. J. (1998). On inflation and inflation uncertainty in the G7 countries. *Journal of International Money and Finance*, *17*(4), 671-689.

Heidari, H., & Bashiri, S. (2010). Inflation and inflation uncertainty in Iran: an application of GARCH-in-Mean model with FIML method of estimation. *International Journal of Business and Development Studies*, *2*(1), 131-146.

Htay, S. Burma Economic Review.

Jiranyakul, K., & Opiela, T. P. (2010). Inflation and inflation uncertainty in the ASEAN-5 economies. *Journal of asian Economics*, *21*(2), 105-112.

Jafari Samimi, A., & Motameni, M. (2009). Inflation and Inflation uncertainty in Iran. *Australian Journal of Basic and Applied Sciences*, *3*(3), 2935-2938.

Karahan, Ö. (2012). The Relationship between Inflation and Inflation Uncertainty:

Evidence from the Turkish Economy. *Procedia Economics and Finance*, *1*, 219-228.

Kontonikas, A. (2004). Inflation and inflation uncertainty in the United Kingdom, evidence from GARCH modelling. *Economic modelling*, *21*(3), 525-543.

Koji, K. U. B. O. (2010). Natural Gas Export Revenue, Fiscal Balance and Inflation in Myanmar.

Moroke, N. D., & Luthuli, A. (2015). An Optimal Generalized Autoregressive Conditional Heteroscedasticity Model for Forecasting the South African Inflation Volatility. *Journal of Economics and Behavioral Studies*, *7*(4), 134.

Moradi, M. A. (2006). *A GARCH Model of Inflation and Inflation Uncertainty in Iran* (No. 23800092). EcoMod.

Myint, M. (1997). Thoughts on a Development Strategy for Myanmar.

Myint, U. (2012). *Myanmar economy: a comparative view* (No. id: 4783).

Nazar, D., Farshid, P., & Mojtaba, K. Z. (2010). Asymmetry Effect of Inflation on Inflation Uncertainty in Iran: Using from EGARCH Model, 1959-2009. *American Journal of Applied Sciences*, *7*(4), 535.

Oten-Abayie, E. F., & Doe, S. K. (2013). Inflation and inflation uncertainty in Ghana. *E3 Journal of Business Management and Economics*, *4*(12), 259-266.

Sharaf, M. F. (2015). Inflation and Inflation Uncertainty Revisited: Evidence from Egypt. *Economies*, *3*(3), 128-146.

Tashkini, A. (2007). Does Higher Inflation Lead to More Inflation Uncertainty? (The case of Iran). *Iranian Economic Review*, (19), 73-87.

Thein, M. (2004). *Economic development of Myanmar*. Institute of Southeast Asian Studies.

Thornton, J. (2007). The relationship between inflation and inflation uncertainty in emerging market economies. *Southern Economic Journal*, 858-870.

Nian, L. C. (2009). *Application of ARIMA and GARCH Models in Forecasting Crude Oil Prices* (Doctoral dissertation, A Dissertation Submitted in Partial Fulfillment of the Requirement for the Award of the Degree of Master of Science (Mathematics)).