J. Basic. Appl. Sci. Res., 2(6)6108-6114, 2012
© 2012, TextRoad Publication

ISSN 2090-4304
Journal of Basic and Applied Scientific Research
www.textroad.com

Inflation, Inflation Uncertainty and Output Growth, Are They Related? A Study on South East Asian Economies, 1960-2010

Farhan Ahmed Mughal[1], Nasir Aslam[2], Muhammad Abdual Jabbar[3], Professor Wasim Ullah[4]

[1,2,3]MS Scholar International Islamic University Islamabad, Pakistan
[4]Director Staff College, National Bank of Pakistan

ABSTRACT

The objective of this study is to investigate the relationship between inflation, inflation uncertainty and real output Growth in South East Asian Countries from 1960-2010. GARCH model is used for measuring volatility in inflation and the asymmetric behavior of inflation is captured through E-GARCH model estimation. Inflation uncertainty was captured through Conditional variance of inflation and the relationship between inflation uncertainty, Inflation and Output Growth is measured through the Granger-Causality. Our results are consistent with the Cukierman–Meltzer hypothesis about inflation and inflation uncertainty as there we found no significant relationship between inflation uncertainty and output Growth.
KEY WORDS: Inflation uncertainty, Output Growth, GARCH and E-GARCH.

INTRODUCTION

Economic sector plays a vital role in the development of a country. Inflation is the rise in the general price level of all the goods and services produced in an economy over a period of time. Whereas uncertainty in inflation is that the future price levels are unpredictable due to uncertain economic environment. Friedman (1977) directed towards relationship between inflation and inflation uncertainty that cause a rise in consumer price levels and low economic growth. In current situation it would be difficult to find any single economy which was not affected by the threat of inflation. Therefore a large number of studies, both theoretically and empirically have been carried out to this test this phenomenon. Inflation uncertainty is one of the major causes of lower future investments and savings as it creates uncertainty about future prices and hence results in lower economic activity (Rizvi and Naqvi, 2008). So uncertainty is the major hurdle for the economic agents to plan their investments in such uncertain economic environment. Different statistical models employed by different researchers, most studies focuses upon examining the causality between inflation and its uncertainty on major economies such as US (Bhar and Mallik, 2010), UK (Kontonikas, 2004) and regional economic associations such as G7 (Griera and Perry, 1998), European Union (Neanidis and Savva 2011), SAARC (Asghar et. al, 2011), ASEAN (Berumenta and Dincer, 2005) etc.

This current study is considered to be an addition to existing body of knowledge and in understanding the causal relation between inflation, its uncertainty and output growth on South East Asian economies and testing the Cukierman–Meltzer hypothesis (1986) as last two decades gained remarkable attention to this particular area. As objective of this study is to test the relationship between the inflation and inflation uncertainty and to find whether the inflation has its effect on real output growth of East Asian Economies, countries included inthis facet are Indonesia, Thailand, Philippines, and Malaysia. This study is extended over the time period of 1960–2010.

The former part of this paper is organized as follows. In section 2, there is a review of the literature on inflation and uncertainty and findings from previous studies. Section 3, comprises of data description and methodology while results are tabulated and discussed in Section 4. Section 5 is comprised of concluding remarks.

LITERATURE REVIEW

The notion that increased inflation give rise to increased inflation uncertainty results in higher cost was first proposed by Friedman (1977) in his Nobel speech on inflation uncertainty and unemployment.

***Corresponding Author:** Farhan Ahmed Mughal, MS Scholar International Islamic University Islamabad, Email: farhanahmed21@live.com

Today we have an extensive literature available supporting Fried's Hypothesis. Cukierman and Meltzer (1986) demonstrate that the average inflation rate is raises by the higher inflation uncertainty. This hypothesis of Fried was adopted by Ball (1992) in the perspective of unequal distribution of information between the policy developers and public. Holland (1995) shedding light on the role of central banks in controlling the higher level of inflation through adopting a strict monetary measure at certain level than the effects of inflation uncertainty can be minimized.

Grier and Perry (1998) in their work on data ranging from 1948-1993on inflation and its uncertainty find that inflation causes uncertainty in G7 countries. In another work on G7 countries, by Berumenta and Dincer (2005) in their study on inflation data ranging from 1957-2001, established the fact that inflation is the cause of inflation uncertainty in all G7 member states and uncertainty causes inflation in 4 member countries and rest of the countries are not affected by it. They also found that increased inflation uncertainty lowers inflation except one member (Japan) where it fosters inflation.

Neyapti (2000) and Nas and Perry (2000) measured the relationship between inflation and uncertainty and finds a positive and significant association, she used monthly data of whole sale price index data from 1982-1999 for Turkey. Further studies on Turkey by Telatar and Telatar (2003) who show causative relationship between these and they documented no correlation between inflation and its uncertainty as an effect of Hetroskadasticty in disturbance terms and Berument et al. (2011) they employed SVM (stochastic volatility in mean) model, and find that that relationship between inflation and inflation uncertainty is important and positive. They used dynamic framework to show relation between inflation and inflation uncertainty in Turkey.

A study was carried out by Fountas (2001) on UK inflation data from 1885-1988, he also finds that higher inflation leads to inflation uncertainty while work by Hwang (2001) using monthly inflation data for United States from 1926 to 1992, through ARFIMA-GARCH model discovered that inflation uncertainty is negatively affected by inflation on weekly basis and inflation does not affect inflation uncertainty. Kontonikas (2004) found a significant relationship between previous period inflation and uncertainty in next period inflation in his study on U.K economy from 1972-2002.

Daal, Naka and Sanchez (2005) examined the relationship on emerging and developed countries found that inflation has strong and positive impact in causing inflation uncertainty in these countries. Thornton (2006) affirmed the Friedman's hypothesis increasing level of inflation cause inflation uncertainty in their study on South Africa.Thornton (2007) in his work on twelve developing market economies and his findings also has supported the Friedman Ball Hypotheses that higher inflation leads to inflation uncertainty. Hwang (2007) has measures the causality between inflation and real growth on data ranging from 1947-2005, applying causality tests like VARMA-ML and Asymmetric VGARCH found that higher instability in inflation results in higher instability towards real growth while real growth has no strong influence on inflation. Payne (2008) extended this relationship to Caribbean countries and found a positive and significant relationship between inflation and inflation uncertainty in two Caribbean countries and negative relationship in one country namely in Jamaica. Mladenovic (2008) measured the relationship between inflation and its uncertainty in the long and short run on Serbian economy 2001-2007 in transition period and conclude that high inflation is the result of high inflation uncertainty.Thornton (2008) employing unit root test and GARCH (1, 1) Model on Argentina from 1810-2005 and found that inflation has no unit root and a positive and short run relation found between the mean and variance of inflation using GARCH model.

Caporale and Kontonikas (2008) in their study on 12 European monetary Union member states and they found no steady pattern for the inflation in these countries. Neanidis and Savva (2011) using GARCH-M, studied the causal relation between inflation and inflation uncertainty on newly members of European Union and those who have applied for its membership, he found that before entering in EU, inflation is significantly affected by inflation uncertainty and found no significant impact during and after union.

Extensive work has also been done to examine the relationship of other economic factors like GDP, oil prices and output growth between inflation and inflation uncertainty. Kormendi and Maguire (1985), DeGregario (1993) and Gomme (1993) find significant and negative relationship between output growth and inflation. Bruno and Easterly (1996) find a negative relationship between inflation and growth in the short run. The negative effect of inflation and growth is supported by Klump, (2003), Gillman, Harris and Matyas (2003) in their studies. Fountas, Karanasos, and Kim, (2006) finds the negative impact of growth due to higher inflation in numerous countries.Wu, Chen, and Lee (2003) studied the relationship between inflation uncertainty and Real Gross Domestic Product found that uncertainty is due to variations in

regression values has an important impact upon real GDP and the variations due to Hetroskadasticty are insignificant.Grier and Grier (2006) documented that growth is negatively affected and didn't directly affected by inflation uncertainty on average. They also established that inflation uncertainty is much higher in before and after the election period. Wilson (2006) in his work Japan reveals that increased inflation uncertainty causes the inflation to increase inflation and lowers output growth using Bivariate Garch-M Model. The investigation of Conrad and Karanasos (2008) stated that high level of inflation influenced the growth instability. Rahman and Serletis (2009) studied this relationship inflation uncertainty and economic movement on four industrialized countries finds that results vary for output growth across each country.

Berument et al (2009) using Stochastic Volatility in Mean has examined the influence of rising Inflation uncertainty on inflation in United States of America from 1976-2006, they presented that rising in inflation uncertainty positively affect the inflation constantly. Bharand Mallik, (2010) found that inflation is positively affected by the oil prices output and the level of inflation is positively influenced by the inflation uncertainty and for output growth they found a negative impact. Their work was on United States and EGARCH-M model is used for estimation. Fountas, (2010) in their work on industrial countries through annual historical data to test link the inflation, inflation uncertainty and growth and found that inflation uncertainty has positively affected the inflation, causality do not defined well and finally that the growth is not affected by inflation uncertainty.Previous work on inflation and inflation uncertainty and output growth yield that inflation causes inflation uncertainty and no significant relationship between inflation uncertainty and output growth.

DATA AND METHODOLOGY

We use annual data of CPI and GDP is used as proxy for output growth, to create the inflation and growth respectively and the data is taken from the World Bank. The data is available for the time period 1960-2010 and it is measured as follows:

$$ln = 100*ln\ (pt/pt\text{-}1)$$

Where ***pt*** represents current period price and ***pt-1*** is the previous period price. First of all the data for inflation and GDP is measured for the stationarity to analyze for the trend in series. This is done through the Dickey Fuller (ADF) test and Phillips-Perron test. Most studies used GARCH models to in determining relationship between inflation and its uncertainty as all discussed above in the section, we followed those studies. Then the next step is the test for Heteroskedasticity in inflation series and it is measured through these Models for all the countries. In predicting the volatility changes the ARCH/GARCH framework proved to be very successful. Engle (1982) presented the first ARCH model. The model suggests that the variance of the residuals at time t depends on the squared error terms from past periods. So the ARCH (p) process will be as:

Mean Equation for the ARCH Model

$$\pi_t = \mu + \sum_{j=1}^{p} \theta_j \pi_{t-j} + \varepsilon_t$$

Where π represents the inflation and it is an AR (p) process.

Variance Equation for ARCH Model

$$h_t = \omega_0 + \sum_{j=1}^{q} \alpha_j \varepsilon_{t-j}^2$$

Here ***h*** represents variance.

EGARCH (p, q) model of Nelson 1991 was utilized to capture the asymmetric behavior of Inflation. The variance equation for EGARCH model is as given

$$ln(h_t) = \omega_0 + \Sigma_{i=1}^{p} \beta_i ln(h_{t-i}) + \Sigma_{j=1}^{q} \alpha_j \left| \frac{\varepsilon_{t-j}}{\sqrt{h_{t-j}}} \right| + \sum_{j=1}^{q} \gamma_j \frac{\varepsilon_{t-j}}{\sqrt{h_{t-j}}}$$

where,**ω** is the constant, **β, α** and ***y*** are the coefficients to be estimated.Whether one variable is useful in predicting the other variable .This approach is used to examine the causality between inflation and its uncertainty (Granger, 1969). It runs bivariate equation as follows:

$$Inflation = Constant + \sum Inflation\ (-1) + \sum Inflation\ Uncertainty\ (-1)$$
$$Inflation\ Uncertainty = Constant + \sum Inflation\ Uncertainty\ (-1) + \sum Inflation\ (-1)$$

RESULTS AND DISCUSSION

Table 1 reports the results of Unit root through Dickey Fuller Test (ADF) and Phillips-Perron PP test for Consumer Price Index. All the series contains no unit root at level at 5% critical value and data is stationary.Stationarity is for series of GDP (Current US$) is also measured for all the countries. Table 2 confirms that there is no trend in data and all the series are contains no unit root at level.

Table 1. Unit Root Tests for CPI					**Unit Root Tests for GDP**			
Country	**Dickey Fuller ADF**	**Critical Value**	**Phillips-Perron PP**	**Critical Value**	**Dickey Fuller ADF**	**Critical Value**	**Phillips-Perron PP**	**Critical Value**
Thailand	-3.655477	-2.921175	-3.690144	-2.921175	-4.21771	-2.921175	-4.30071	-2.921175
Indonesia	-3.178186	-2.921175	-3.236092	-2.921175	-5.90396	-2.931404	-5.893532	-2.931404
Malaysia	-3.957536	-2.921175	-3.912317	-2.921175	-5.598383	-2.921175	-5.503363	-2.921175
Philippines	-4.884682	-2.921175	-4.884682	-2.921175	-6.100635	-2.921175	-6.095091	-2.921175

ARCH/GARCH Models Estimation

ARCH model is used to measure the volatility in inflation series. Table 2 reports the results for the ARCH effect in the residual series of Thailand because of significant and positive value of ARCH (1) represented by β in the variance equation of ARCH (1) table. The inflation uncertainty is captured through the EGARCH (1, 1). The results of EGARCH (1, 1) in table given below where the coefficient **y = 0.690694** represents the asymmetry of information because it is non-zero, hence positive and significant value indicates that the positive shocks to inflation cause more inflation uncertainty in Thailand.

Thailand Table 2.	**ARCH (1)**				**E-GARCH**			
Mean Equation	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
Variables								
C	1.406893	0.402184	3.498133	0.0005	2.029407	0.43881	4.624796	0.0000
Inf.(-1)	0.534822	0.109513	4.883629	0.0000	0.466641	0.113964	4.094646	0.0000
Variance Equation								
ω	1.884661	1.633291	1.153904	0.2485	2.002901	0.555176	3.607689	0.0003
β	1.279879	0.382684	3.344483	0.0008	-0.457581	0.232857	-1.965077	0.0494
α					0.838357	0.327948	2.556373	0.0106
y					0.690694	0.382143	1.807423	0.0707

ARCH (1) effect is also significant in inflation series of Indonesia reported in Table 3 and the non-zero value of y = 1.157224 also indicates the presence of asymmetric information and more significant and positive value as compares to Thailand. Results lead to the inference that more positive shocks to inflation produce more inflation uncertainty in Indonesia. Results are reported in Table 4.

Indonesia Table 3.	**ARCH (1)**				**E-GARCH**			
Mean Equation	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
Variables								
C	10.09948	2.304985	4.38158	0.0000	2.464124	1.319161	1.867948	0.0618
Inf.(-1)	0.082654	0.221294	0.373504	0.7088	0.692421	0.016613	41.68029	0.0000
Variance Equation								
ω	9.829712	8.270325	1.188552	0.2346	6.001353	0.408141	14.70413	0.0000
β	2.427041	1.250076	1.941515	0.0522	-0.261549	0.064284	-4.068623	0.0000
α					0.56499	0.19111	2.956355	0.0031
y					1.157224	0.185987	6.22207	0.0000

Malaysia

Evidence of ARCH effect in case of Malaysia is less significant at 15% critical value. When estimated for EGARCH (1, 1) model the value of **y**= 0.325144 indicates the presence of asymmetric information due

to non-zero value and the positive and less significant value indicates that more positive shocks leads to less uncertainty in Malaysia.

Malaysia Table. 4	ARCH (1)				E-GARCH			
Mean Equation	Coefficient	Std. Error	z-Statistic	Prob.	Coefficient	Std. Error	z-Statistic	Prob.
Variables								
C	1.091023	0.518575	2.103888	0.0354	1.28765	0.262079	4.913207	0.0000
Inf.(-1)	0.502383	0.117885	4.261638	0.0000	0.50683	0.0989	5.12466	0.0000
Variance Equation								
ω	4.406715	1.849455	2.382709	0.0172	1.375898	0.460301	2.989128	0.0028
β	0.431072	0.276204	1.5607	0.1186	-0.416032	0.206194	-2.017672	0.0436
α					0.890487	0.233825	3.80835	0.0001
y					0.325144	0.408235	0.796463	0.4258

Philippines

ARCH (1) effect is found in the series of inflation in the variance equation reported in the Table 5. And the significance but negative value of Y= -0.702727 does not predict the presence of asymmetric information.

Philippines Table. 5	ARCH (1)				EGARCH			
Mean Equation	Coefficient	Std. Error	z-Statistic	Prob.	Coefficient	Std. Error	z-Statistic	Prob.
Variables								
C	5.788635	1.176305	4.921032	0.0000	3.847202	1.476775	2.605138	0.0092
Inf.(-1)	0.339505	0.095328	3.561455	0.0004	0.557653	0.151504	3.680776	0.0002
Variance Equation								
ω	1.693002	2.026069	0.835609	0.4034	1.841515	1.133888	1.62407	0.1044
β	-0.052179	0.011515	-4.531387	0.0000	0.58815	0.281487	2.089435	0.0367
α					0.864023	0.321872	2.684366	0.0073
y					-0.702727	0.345144	-2.036043	0.0417

Granger Causality Test

We reject the Null hypothesis of Inflation uncertainty does not Granger causes inflation in all the five countries and effect is positive and we can say that inflation uncertainty causes the inflation to increase. Our results are consistent with the Cukierman–Meltzer hypothesis. Second we found partial relationship between inflation uncertainty and output growth. We reject the Null Hypothesis of Inflation uncertainty does not Granger cause output growth for Thailand.

Table. 6	Ho: Inflation uncertainty does not Granger-cause inflation			Ho: Inflation uncertainty does not Granger-cause growth		
Country	F-statistic	p-value	Sign	F-statistic	p-value	Sign
Thailand	2.78839(1)	0.10189	+	2.78839(1)	0.10189	+
Malaysia	4.34584(1)	0.04268	+	0.55209(2)	0.57977	+
Philippines	1.78157(1)	0.18853	+	1.44613(2)	0.2467	+
Indonesia	4.82541(3)	0.00584	+	0.82886(2)	0.4447	+

Conclusion

The relationship between the inflation and inflation uncertainty is under great attention for wide research from the last two decades, this particular study was conducted to find whether the inflation uncertainty causes the inflation and whether it has impact on real output growth of Four South East Asian economies namely Indonesia, Thailand, Philippines, Malaysia. This study is extended over the time period from 1960–2010.Stationarity is examined through Dickey Fuller (ADF) test and Phillips-Perron test.GARCH model used for the measuring the volatility in inflation and the asymmetric behavior of inflation is captured through EGARCH model estimation. Inflation uncertainty is measured through

Conditional variance of inflation and the relationship between inflation uncertainty, Inflation and Output Growth is measured through the Granger-Causality. Our results are consistent with the Cukierman–Meltzer hypothesis. Second we found partial relationship between inflation uncertainty and output growth. We reject the Null Hypothesis of Inflation uncertainty does not Granger cause output growth in Thailand.

REFERENCES

- Asghar A., Ahmed K., Ullah S., Zaman, B.U. and 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, Issue 66.
- Berument, H., Yalcin, Y., and Yildirim, J., (2009). The effect of inflation uncertainty on inflation: Stochastic volatility in mean model within a dynamic framework. Economic Modelling 26, pp. 1201–1207.
- Berumenta, H., and Dincer, N., N., (2005). Inflation and inflation uncertainty in the G-7 countries. Physica, A 348, pp.371–379.
- Ball, L., 1992. Why does higher inflation raise inflation uncertainty? J. Monetary Econ. 29, 371–378.
- Brunner, A., D., (1993). Comment on Inflation Regimes and the Sources of Inflation Uncertainty. Journal of Money, Credit and Banking, Vol. 25, No. 3, pp. 512-520.
- Bhar, R., and Mallik, G., (2010). Inflation, inflation uncertainty and output growth in the USA. Physica A 389, pp. 5503–5510.
- Berument, M., H., Yalcin, Y., and Yildirim, J., O., (2011). The inflation and inflation uncertainty relationship for Turkey: a dynamic framework. Empirical Economic 41, pp. 293–309.
- Bhar, R., Mallik, G., (2010), Inflation, inflation uncertainty and output growth in the USA Physica A, 389, 5503–5510.
- Bruno, M. and Easterly, W. (1996). 'Inflation and growth: in search of a stable relationship'. Review Federal Reserve Bank of St. Louis, 139–146.
- Caporale, G., M., and Kontonikas, A., (2008). The Euro and inflation uncertainty in the European Monetary Union. Journal of International Money and Finance.
- Conrad, C., and Karanasos, M., (2008). Modelling Volatility Spill overs between the variabilities of US Inflation and Output: The UECCC GARCH Model, University of Heidelberg Working Papers 0475.
- Cukierman, A., Meltzer, A., 1986. A theory of ambiguity, credibility and inflation under discretion and asymmetric information. Econometrica 54, 1099–1128.
- Daal, E., Naka, A., and Sanchez, B., (2005). Re-examining inflation and inflation uncertainty in developed and emerging countries. Economics Letters 89, pp. 180–186.
- DeGregario, J., (1993). Inflation, Taxation, and Long-Run Growth. Journal of Monetary Economics. 271–98.
- Fountas, S., (2001). The relationship between inflation and inflation uncertainty in the UK: 1885–1998. Economics Letters 74, pp. 77–83.
- Fountas, S., (2010). Inflation, inflation uncertainty and growth: Are they related? Economic Modelling 27, pp. 896–899.
- Fountas, S., Karanasos, M., and Kim, J., (2006). Inflation Uncertainty, Output Growth Uncertainty and Macroeconomic Performance. Oxford Bulletin of Economics and Statistics, 68, 3, 0305-9049
- Friedman, M., (1977). Nobel lecture: inflation and unemployment. J. Polit. Econ. 85, 451–472.
- Gillman, M., Harris, M. and Matyas, L. (2003). 'Inflation and growth: explaining a negative effect', Empirical Economics, Vol. 1, 149–167.
- Gomme, P. (1993). Money and Growth Revisited: Measuring the Costs of Inflation in an Endogenous Growth Model. Journal of Monetary Economics 32 : 51–77.
- Grier, K., B., and Perry, M., J., (1998). On inflation and inflation uncertainty in the G7 countries. Journal of International Money and Finance 17, pp. 671-689.
- Grier, R., and Grier, K., B., (2006). On the real effects of inflation and inflation Uncertainty in Mexico. Journal of Development Economics 80 (2006) 478– 500.
- Hwang, Y., (2001), Relationship between inflation rate and inflation uncertainty. Economics Letters 73, pp. 179–186.
- Hwang, Y., (2007). Causality between inflation and real growth. Economics Letters 94, pp. 146–153.
- Holland, S., (1995). Inflation and uncertainty: Tests for temporal ordering. Journal of Money, Credit, and Banking, 27, 827-837.

- J-L., Wu, S-L., Chen, H-Y., Lee, (2003). Sources of inflation uncertainty and real economic activity. Journal of Macroeconomics 25 (2003) 397–409.
- Klump, R. (2003). Inflation, Factor Substitution and Growth, European Central Bank, Working Paper No. 280.
- Kontonikas, A., (2004).Inflation and inflation uncertainty in the United Kingdom, evidence from GARCH Modelling. Economic Modelling 21, pp. 525–543.
- Kormendi, R., C., and Meguire, P., G. (1985). Macroeconomic Determinants of Growth: Cross-Country Evidence. Journal of Monetary Economics, 141–63.
- Mladenovic, Z. (2007). Relationship between Inflation and Inflation Uncertainty: The Case of Serbia, 8th Balkan Conference on Operational Research, Belgrade, Serbia.
- Neanidis, K., C., and Savva, C., S., (2011). Nominal uncertainty and inflation: The role of European Union membership. Economics Letters 112, pp. 26–30.
- Nas, T., F., and Perry, M., J., (2000) Inflation, Inflation Uncertainty and monetary Policy in Turkey: 1960-1998. Contemporary Economic Policy, Vol.18, No. 02, pp. 170-180.
- Neyapti, B., (2000). Inflation and inflation uncertainty in Turkey: evidence from the past two decade. http://www.bilkent.edu.tr/~neyapti/shortstudies/012000.pdf
- Payne, J., E., (2008). Inflation and inflation uncertainty: evidence from the Caribbean region. Journal of Economic Studies, Vol. 35 No. 6, pp. 501-511
- Rahman, S., and Serletis, A., (2009). The effects of inflation uncertainty: some international evidence. Journal of Economic Studies Vol. 36 No. 5, pp. 541-550
- Rizvi, K. A. and Naqvi B. 2008, "Asymmetric Behavior of Inflation Uncertainty and Friedman Ball Hypothesis: Evidence from Pakistan", the Lahore Journal of Economics, 15: 2, pp. 1-33.
- Thornton, J., (2008). Inflation and inflation uncertainty in Argentina, 1810–2005. Economics Letters 98, pp. 247–252.
- Thornton, J., (2007) The Relationship between Inflation and Inflation Uncertainty in Emerging Market Economies. Southern Economic Journal, Vol. 73, No. 4, pp. 858-870.
- Thornton, J., (2006). High And Variable Inflation: Further Evidence On The Friedman Hypothesis, South African Journal of Economics, Economic Society of South Africa, vol. 74(2), pages 167-171, 06.
- Telatar, F., and Telatar, E., (2003). The Relationship between Inflation and Different Sources of Inflation Uncertainty in Turkey. Applied Economics Letters, Volume 10, Issue 7, 431–435.
- Wilson, B., K., (2006). The links between inflation, inflation uncertainty and output growth: New time series evidence from Japan. Journal of Macroeconomics 28 (2006) 609–620.
- Wu, J. L., Chen, S. L. and Lee, H. Y. (2003). Sources of Inflation Uncertainty and Real Economic Activity. Journal of Macroeconomics 25, 397-409.