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The Effects of Rate and Variability of Inflation on Output Growth Variability: Evidence from Selected Countries*

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1. INTRODUCTION

The relationship between the inflation rate and its variability and its effect on output growth has been investigated widely during the last two decades. Higher inflation rates lead to higher variability in inflation which causes greater uncertainty in production and investment decisions. Consequently output growth is distorted. Logue and Sweeney (1981) argue that there is a positive effect of the inflation rate and its variability on the variability of real economic growth. In contrast to the findings of Logue and Sweeney (1981), Katsimbris (1985), using country level data (without pooling) for eighteen OECD countries, does not find support for the positive relationship between the inflation rate and its variability and output growth variability. According to him the positive and significant results obtained by Logue and Sweeney from the cross-section (pooled) data are not reliable because of the aggregation bias.

The present study examines empirically the effects of inflation rate and its variability on output growth variability in selected countries.[1]

The plan of the paper is as follows. Section 2 presents the methodology adopted in the study. The results are presented in Section 3. The last section summarises the main conclusions.

2. METHODOLOGY

The present study focusses on the effects of the inflation rate and its variability

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[1]The countries included in the sample are Pakistan, India, Malaysia, Thailand, Japan, Philippines, Korea, Sri Lanka, Iran and Turkey.

on output growth variability. Output growth variability has been estimated in the following four different ways:

First, variability of real output (GDP) growth is regressed on the current values of inflation measured by CPI assuming that the output growth variability is affected by the current "expected" inflation rate.

Second, it is regressed on the current value of inflation and past value of the output growth variability as it is assumed that the dependent variable is dependent on the current value of the independent variable and the lagged value of its own.

Third, the growth rate variability of output is regressed on the standard deviation of the inflation rate.

Lastly, the lagged dependent variable has also been used on the left-hand side (LHS) of the estimated equation along with the variability of the inflation rate.

Equations are estimated using the Ordinary Least Square (OLS) method. Autocorrelation is removed by applying the Cochrane-Orcutt transformation technique. Three year moving estimates of the inflation rate, its variability and the variability of the growth of real output are calculated. Moving or non-moving average inflation rate is a measure of the desired rate of inflation while the corresponding standard deviation is a measure of the next period's uncertainty. The direction and the strength of the relationship between inflation rate, its variability and the output growth variability are seen from the sign of the coefficient depending upon the significance of t-ratios.

The annual data from 1960 to 1990 for the Consumer Price Index (CPI) and Gross Domestic Product (GDP) for each country included in the sample are taken from the International Financial Statistics of the IMF [International Monetary Find (1988)] and the data for some years for Pakistan have been obtained from the Pakistan Economic Survey 1990-91 [Government of Pakistan (1991)].

The analysis is based on country level (without pooling) data. Data for the countries, except Pakistan, for the last three years have been generated by taking the average of the preceding three year's growth rates and multiplying it by the last observations successively. The same rule has been applied for the missing data. The regressions for the pooled data are also computed and are reported in the last rows of Tables 2 and 3.

The following equations have been estimated for each country.

$$GY_{it} = a_{it} + bP_{it} + U_{it} \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

$$GY_{it} = c_{it} + dP_{it} + eGY_{it-1} + U_{it} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

$$GY_{it} = f_{it} + gGP_{it} + U_{it} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (3)$$

$$GY_{it} = h_{it} + jP_{it} + kGY_{it-1} + U_{it} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (4),$$

where,

GY = Standard deviation of the growth rate of output;
p = Average current inflation rate;
GP = Standard deviation of the inflation rate;
GY–1 = Sagged value of the output growth variability a b c d e f g h j and k are parameters $U1$, $U2$, $U3$ and $U4$ are individually and mutually uncorrelated random error terms;
(i = Countries 1,...,j); and
(t = Time 1,....., t).

3. RESULTS

Growth rates of real income and inflation are presented in Table 1. The entire period from 1960 to 1990 has also been divided into three decades i.e. 1960s, 1970s, 1980s. Pakistan, Thailand, Japan, Korea and Iran had experienced high inflation rates in the 1970s than in the 1960s and the 1980s. The oil price shock of 1973 probably explains the high level of inflation. The prices were more

Table 1

Growth Rates of Real Income and the Inflation Rate (1960–90) (%)

Countries	Whole Period		1960s		1970s		1980s	
	Y	CP	Y	CP	Y	CP	Y	CP
Pakistan	5.70	8.16	6.51	3.53	4.98	12.82	6.58	5.26
India	3.93	7.52	3.50	7.18	3.72	7.23	5.13	8.08
Malaysia	5.09	3.93	11.07	1.00	7.51	6.20	3.55	2.39
Thailand	6.49	5.97	7.91	2.02	7.19	9.73	4.55	2.48
Japan	6.10	6.09	11.60	5.42	4.21	9.39	3.90	1.65
Philippines	1.47	11.58	4.97	5.20	6.23	12.70	–1.01	16.47
Korea	8.69	12.12	6.99	13.47	8.73	15.24	8.46	3.17
Sri Lanka	3.87	7.52	5.23	2.58	4.87	7.73	–1.40	9.22
Iran	5.43	9.82	9.29	1.58	2.65	13.22	4.61	11.81
Turkey	6.33	22.28	5.84	3.96	5.54	25.59	10.78	33.20

Notes: Y Indicates Real Income.
CP Indicates Inflation Rate.
Growth rates are computed by semi-log regressions against time.
* Indicates that the 1980s consists of from 1981 to 1988.

stable during the 1960s in there countries except for Japan and Korea in which the decade of the 1980s saw comparative price stability.

In the case of six countries, the growth rates of real output in the 1960s were first in importance while for Malaysia and Philippines, growth rates were relatively high in the 1970s and for Pakistan, India and Turkey, the growth rates of real output in the 1980s were relatively more than the 1960s and the 1970s.

Country-wise analysis indicates that Pakistan ranks at the fifth both in the growth of output and inflation rate over the entire period. Korea's position in output growth was first, while it was second for the growth of the inflation rate. Relative to all other countries, Malaysia ranks low for both the inflation rate and the growth of the output. Inflation growth in Turkey during the 1970s, and the 1980s remained greater than all other countries included in the sample.

The analysis of Table 2 shows that the inflation rate in the case of India and Thailand affected the standard deviation of output positively and significantly while its effect on output deviation was significant but negative in the case of Malaysia. For the seven out of ten countries the relationship between the inflation rate and the standard deviation of the output is found to be insignificant. It is negative and insignificant for Pakistan, Philippines, Sri Lanka and Turkey. In the case of Japan, Korea and Iran the relationship between the two series was positive and insignificant. When the lagged dependent variable is included in the specification, results do not change. The lagged dependent variable is found to be positive and significant for Malaysia and Iran. In the case of all other countries, the estimated coefficients turn out to be insignificant as before.

In Table 3 the relationship between variability of inflation rate and output growth variability has been investigated. The variation in the inflation rate affects positively and significantly only in the case of India and Thailand. For four countries the relationship is found to be negative and for two countries positive. The important thing to note, however, is that the estimated coefficients are insignificant. Results do not change for India and Thailand even when the lagged dependent variable is included in the analysis. In the case of Malaysia, however, we found a significant negative relationship.

The comparison between Tables 2 and 3 reveals that in India and Thailand, variability in output is affected positively both by inflation rate and its variability while in Malaysia variability of inflation rate has negative and significant effect on output growth variability. When we include the lagged dependent variable in the analysis, the results for Malaysia do not change. However, variability of inflation rate affects positively and significantly both India and Thailand.

The effect of the inflation rate and its variability is found to be insignificant in the case of the cross-sectional (pooled) analysis.

Table 2

	(1) $GY_{i,t} = a_{i,t} + bP_{i,t} + UT_{i,t}$			(2) $GY_{i,t} = c_{i,t} + dP_{i,t} + eGY_{i,t-1} + UT_{i,t}$			
Countries	a	b	$\bar{R}^2$	c	d	e	$\bar{R}^2$
Pakistan	0.030	–0.0001	–0.042	0.028	–0.002	0.003	–0.079
	(5.446)*	(0.313)		(0.261)	(–0.217)	(0.029)	
India	0.018	0.0160	0.151	0.010	0.002	0.619	0.354
	((2.138)*	(2.331)*		(0.852)	(0.328)	(1.751)*	
Malaysia	0.029	–0.013	0.057	0.019	–0.001	0.283	0.079
	(2.844)*	(–1.586)**		(2.253)*	(–1.361)**	(0.957)	
Thailand	0.012	0.001	0.176	0.014	0.001	–0.032	–0.040
	(6.741)*	(2.516)*		(1.477)**	(0.877)	(–0.045)	
Japan	0.017	0.0001	–0.042	0.008	–0.001	0.504	0.197
	(2.121)	(0.019)		(0.696)	(z0.183)	(0.81)	
Philippines	0.584	–0.062	–0.013	1.479	–0.163	1.849	0.001
	(1.189)	(–0.829)		(0.117)	(–1.243)	(0.172)	
Korea	0.032	0.0002	–0.041	0.014	0.006	0.553	0.337
	(4.575)*	(0.062)		(1.487)**	(1.134)	(2.225)*	
Sri Lanka	0.024	–0.0003	–0.004	0.015	–0.001	0.373	0.092
	(2.25)*	(0.943)		(0.643)	(–0.758)	(0.361)	
Iran	0.049	0.005	–0.041	0.016	0.001	0.662	0.367
	(2.346)*	(0.059)		(1.087)	(0.158)	(2.657)*	
Turkey	0.035	–0.0002	–0.038	0.024	–0.0003	0.327	0.026
	(3.331)*	(–0.301)		(0.212)	(–0.223)	(0.102)	
Pooled	0.038	–0.001	–0.003				
	(3.379)*	(–0.347)					

* Indicates 5 percent level of significance.
** Indicates 10 percent level of significance.
Figures in parentheses are *t*-values.

Table 3

	(3) $GY_{i,t} = f_{i,t} + gP_{i,t} + UT_{i,t}$			4) $GY_{i,t} = h_{i,t} + jP_{i,t} + kGY_{i,t-1} + UT_{i,t}$			
Countries	f	g	$\bar{R}^2$	b	j	k	$\bar{R}^2$
Pakistan	0.282	0.006	–0.056	0.022	0.005	0.164	0.007
	(3.442)*	(0.928)		(0.934)	(0.889)	(0.201)	
India	0.036	0.012	0.042	–0.007	0.018	0.688	0.796
	(3.542)*	(1.453)**		(–1.431)**	(4.126)*	(6.213)*	
Malaysia	0.056	0.0003	–0.037	0.024	–0.001	0.165	0.024
	(3.474)*	(–0.309)		(2.146)*	(–1.396)**	(0.475)	
Thailand	0.034	0.003	0.076	0.008	0.001	0.278	0.419
	(3.667)*	(1.745)*		(2.09)*	(3.036)*	(1.04)	
Japan	0.017	–0.002	–0.028	0.008	–0.001	0.522	0.229
	(2.687)*	(–0.564)		(0.8)	(–0.456)	(0.998)	
Philippines	0.044	0.007	–0.017	0.462	–0.065	3.315	–0.055
	(2.511)*	(0.769)		(0.304)	(–0.786)	(0.288)	
Korea	0.028	–0.001	–0.041	0.018	0.0002	0.046	0.118
	(1.86)*	(–0.127)		(0.933)	(0.069)	(0.855)	
Sri Lanka	0.044	0.0004	–0.029	0.015	–0.0003	0.378	0.092
	(3.55)*	(0.551)		(0.587)	(–0.07)	(0.334)	
Iran	0.088	0.005	–0.032	0.024	-0.004	0.610	0.356
	(2.622)*	(0.474)		(1.144)	(0.651)	(2.1)	
Turkey	0.061	–0.001	–0.038	0.024	–0.0002	0.327	0.029
	(2.893)*	(–0.324)		(0.281)	(–0.306)	(0.134)	
Pooled	0.04	–0.001	–0.003				
	(3.724)*	(–0.324)					

* Indicates 5 percent level of significance.
** Indicates 10 percent level of significance.
Figures in parentheses are *t*-values

4. CONCLUSIONS

We can be brief in conclusions. The main findings of the paper are:

(1) The study supports the conclusions reached by Katsimbris (1985) who found no significant relationship between the inflation rate and/or its variability and the variability of the output growth in the case of the country by country analysis;

(2) The positive and significant effect of inflation rate and its variability on the output growth variability as prescribed by Logue and Sweeney (1981) and the relationship between inflation rate and output growth variability as mentioned by Katsimbris (1985) in the case of the pooled data has not been found in our case;

(3) There is an insignificant relationship in most of the countries studied between the rate and the standard deviation of inflation and the standard deviation of the growth of the output;

(4) When the lagged dependent variables are included in the analysis the level of significance of coefficients more or less remains the same; and

(5) Pooling or non-pooling data do not affect the entire results in our case. This is possibly due to the similar socio-economic structures of most of the economies included in the sample.

REFERENCES

International Monetary Fund (1988) *International Financial Statistics.* Washington, D.C.: USA.

Katsimbris, George M. (1985) The Relationship between the Inflation Rate, Its Variability, and Output Growth Variability: Disaggregated International Evidence. *Journal of Money, Credit, and Banking.* 17: 179–188.

Louge, Dennis E., and Richard James Sweeney (1981) Inflation and Real Growth: Some Empirical Results. *Journal of Money, Credit, and Banking.* 13: 497–501.

Pakistan, Government of (1991) *Pakistan Economic Survey 1990-91.* Islamabad: Finance Division, Economic Advisory Wing.