Openness and Inflation: A Case Study of Pakistan

Hanif, Muhammad N. and Batool, Irem

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Muhammad Nadeem Hanif and Irem Batool[1]

Abstract

Romer (1993) postulates a hypothesis that inflation is lower in small and open economies. In this paper we test this hypothesis for Pakistan economy using annual time series data for the period 1973-2005. We find that besides the conventional explanatory variables like real GDP growth, monetary growth, interest rate, and wheat support price, the openness variable such as growth in 'overall trade to GDP ratio' also has significant negative impact on the domestic price growth in Pakistan.

1. Backdrop

Inflation has always been a concern for the policy makers as it creates uncertainty in the economy that may adversely affect economic growth. Therefore, maintaining non-inflationary stable economic growth has been at the core of macroeconomic policies in Pakistan like in many other 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 particularly hard as they do not possess effective inflation hedges.

In Pakistan, against faster expansion of trade to output in the world, the pace of integration into the world economy remained slow before 1970 as Pakistan's share in the world economy fell from 0.5 during 1953-55 to 0.2 during the late 1970s. After the unfortunate East-Pakistan debacle, the decade of 1970s came with a new economic environment for the country. The policies of the government also depicted a shift against the anti-agriculture bias of the past regime. A number of decisions were taken in this period like devaluation of rupee by 47 percent in 1973, which removed the subsidy that the industrialists were enjoying in the form of overvalued exchange rate; liberalization of the import policy by allowing all registered importers to obtain licenses for any number of importable items; the State Bank of Pakistan's Export Refinance Scheme which started in 1973 to facilitate exporters. The major boost for exports came from the decision of de-linking of Pak rupee from US dollar in early 1980s. Besides, for liberalizing the import policy, government introduced a negative list with the specification that everything not on this list was allowed to be imported. These measures proved fruitful for enhancing our level of trade during 1980s. In 1988, Pakistan signed a Structural Adjustment Programme (SAP) with the IMF to address its balance of payments deficit problems which required an emphasis on greater liberalization of both imports and exports. Today we can see our overall trade to GDP ratio has risen from 26.7 percent in 1975 to 35.2 percent of GDP in 2005.

[1] The authors are PhD candidates at Pakistan Institute of Development Economics, Islamabad. The views expressed are those of the authors and should not be attributed to any institution.

This is not an extra ordinary performance when compared with some other developing countries; however, one can see significant role of trade liberalization in maintaining an overall low inflation environment. Openness is likely to affect inflation through its likely positive effect on output (Jin, 2000). Furthermore, as the economy opens up the shocks to the domestic price level due to domestic output fluctuation are likely to ease because of exports (in case of positive shocks) and imports (in case of negative shocks) (Okun, 1981). In addition to this, with the World Trade Organization (WTO) commitment to harmonization of tariff structures across the countries, the import cost of a significant portion of traded commodities is likely to go down. These factors could have important implications for the process of inflation in any country and Pakistan is not an exemption. This motivates us to study the influence of openness on inflation in Pakistan economy.

The rest of the paper has been arranged as follows: section 2 gives some literature review, section 3 outlines the model, methodology and data used, section 4 presents results from an estimated model and their analysis, and the last section gives the concluding remarks.

2. Review of Literature

The relationship between inflation and openness has been a subject of research, theoretical as well as empirical. However, the literature on the subject is relatively scant. 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 cost through changes in composition of inputs procured domestically and internationally, b) better allocation of resources, c) increased capacity utilization, d) rise in foreign investment which can stimulate output growth and ease pressures on prices (Ashra 2002). Okun (1981) postulates that the shocks to the domestic price level due to domestic output fluctuation are likely to ease as the economy opens up.

In early empirical literature Triffin and Grudel (1962) tested the hypothesis that openness leads to cheaper availability of goods that are costly in the country otherwise and confirmed that more open economies tended to experience lower inflation in 5 countries in the European Economic Community.

Iyoha (1973) used a sample of 33 less developed countries and analyzed the relationship for both yearly and 5 year average data from 1960-61 to 1964-65. A negative relationship between openness and inflation emerged when Iyoha related inflation and openness in a bivariate framework using method of ordinary least squares. However, when the analysis was extended to a multivariate exercise, the results were not unambiguous. Though the openness variable was not always significant, it always had a negative sign.

Kirkpatrick and Nixon (1977) while commenting on Iyoha (1973) argued that imports restrictions could worsen the inflation situation. Romer (1993) used a Barro-Gorden type of model for a cross section of 114 countries and argued that inflation is

lower in small and open economies even in the absence of an independent central bank with pre-commitment to price stability.

There have been a few studies on inflation but there is no research work on inflation and openness in the context of Pakistan. This is going to be the first such empirical evidence regarding Pakistan economy.

3. Model, Methodology and Data

Inflation is a complex process and it is very difficult to construct an empirical model for a country. However, it is possible to find the key variables impacting the inflation process in a country like Pakistan. On the basis of monetarists' argument that inflation is always and everywhere a monetary phenomenon, the first determinant of inflation we consider in this study is the rate of (reserve) money growth. Since there are lags in the impact of monetary policy on the real variables we also include first lag of (reserve) money growth. To see how availability of goods and services in the economy eases pressure on the domestic price growth we include real GDP growth in the inflation equation expecting negative sign[2]. From the cost push theories of inflation, we know that cost of capital may also be a significant contributor to inflation. To capture this we also consider change in the over night interest rate as an explanatory variable in our analysis. Khan and Schimmelpfennig (2005) examined the relative importance of monetary factors and structuralist supply-side factors for inflation in Pakistan and concluded that changes in the Wheat Support Price influence inflation behaviour. Following this we also include growth in Wheat Support Price as an explanatory variable.

So our model for inflation in Pakistan is

$$\pi_t = \omega_0 + \omega_1 g_t^M + \omega_2 g_{t-1}^M + \omega_3 g_t^y + \omega_4 \Delta i_t + \omega_5 g_t^{SPWT} + \varepsilon_t \qquad \text{(I)}$$

where π_t, g_t^M, g_t^y, i_t, g_t^{SPWT} represent Inflation, Monetary Growth, real GDP Growth, Overnight Interest Rate and growth in Wheat Support Price respectively at time t. ε is an error term.

Using Augmented Dickey-Fuller (ADF) approach we first test about stationarity of the times series used in this analysis. All of our series are expected to be stationary since these are either in growth or in change form. We first estimate this model using HAC[3] Estimator and apply all the relevant diagnostic tests to the equation. When equation passes these tests then we include a proxy for openness which we take growth in the ratio of trade[4] to GDP. We test if openness has any significant impact on inflation process in Pakistan in the presence of explanatory variables found significant in the estimated equation (I).

[2] There is a vast literature on inflation and growth. We did not go into the details of it.
[3] Heteroscedasticity and Autocorrelation Consistent
[4] sum of the export and import of goods and services

Time span covered in this study is 1973-2005 and we use annual time series data. Following the standard empirical literature on inflation we define it as first log difference of Consumer Price Index. The data on Reserves Money (RESM) and Overnight Interest Rate (ONIR) is taken from internal resources of State Bank of Pakistan. Data on Consumer Price Index[5] (CPIN), real[6] GDP (GDPR), nominal GDP, Support Price of Wheat (SPWT) and the Trade in Goods & Services (TGAS) are taken from various publications of Federal Bureau of Statistics.

4. Estimated Results

From the results of the ADF test presented in the Table 1 (see Appendix) we find that all the times series used in this study are stationary as expected. In Table 2 of the Appendix we present results from regression analysis using HAC Estimator. We have two models there. One related to equation (I) presented above in Section 3 and other related to model when we include proxy for openness as explanatory variable in addition to what we have in equation (I). As far as the variable related to monetary growth is concerned we tested three definitions of money i.e. reserve money, narrow money and broad money. Considering the plausibility of various diagnostic as well as specification tests, we find reserve money (growth) to be most plausible in explaining the inflation behaviour. Rest of the variables are included as we discussed in above section.

The estimated coefficient for reserve money growth is relatively high (and more significant as well) with one period lag[7] as compared to the estimated contemporaneous impact. In line with the results of Khan and Schimmelpfennig (2005) growth in Support Price of Wheat is found to be positive and significant. Joint impact of lagged and contemporaneous monetary growth (0.36) is less (in magnitude) than the impact from the real GDP growth which is about 0.50. All this means that in Pakistan supply side factors are more important than monetary factors in the process of inflation dynamics and this can be supported from the very fact that the coefficient of overnight interest rate is very small (0.01) though econometrically significant[8]. Parsimoniousness of the model can be judged from the various tests-statistics we have put in the Table 2. The model passes all the relevant diagnostic tests including the Chow Breakpoint (at 1991) test.

To investigate the possible impact of openness on domestic price growth we augment equation (I) by including a proxy for openness. The results of the estimated augmented model are presented in the last column of the Table 2. There is not any significant impact on the results for the coefficients of the variables we already have in the Model (I). Rather, the size and significance of the coefficients related to reserve money growth are improved. Openness has negative and significant impact on the inflation in Pakistan which supports the Romer (1993) hypothesis that inflation is lower in small and open economies. Our results are also consistent with that reported in Terra (1998) and Ashra (2002). Further analysis is needed to explore the channels through

[5] Base 2000-01
[6] Base 1999-00
[7] which shows that more of monetary growth impact on inflation falls in the next year than the current year
[8] This observation may be taken with caution since we are using annual data from the last three decades.

which shocks to the domestic prices level are eased because of more and more openness of the economy.

5. Concluding Remarks

Like in other developing countries maintaining low inflation without hurting the economic growth of the economy are the main macroeconomic policy objectives in Pakistan. Inflation is complex process and developing an empirical model for the same is not an easy task. However, we have attempted in this study to model the behviour of inflation by focusing on how more integration with the rest of the world affects inflation in Pakistan economy. While controlling for all the standard theoretical determinants of inflation we find that openness has significant negative impact on the domestic price growth. These results support the Romer (1993) hypotheses that inflation is lower in small and open economies. We suggest further analysis to explore the channels through which shocks to the domestic prices level are eased because of opening of the economy.

Appendix:

Table 1: Results of Unit Root Analysis

Variables	**DF/ADF Test Value (p-values in parenthesis)***	**Lag[9] (included)**
π	-2.73 (0.0080)	0
g^M	-3.89 (0.0057)	1
g^y	-3.90 (0.0054)	0
Δi	-5.13 (0.0002)	0
g^{SPWT}	-5.56 (0.0001)	0
OPENNESS	-6.22 (0.0000)	0
*: MacKinnon's one-sided p-values		

Table 2: Results of Regression Analysis using HAC Estimator
(Inflation Rate, π_t, as dependent variable)

Variable	**Model – I (test-statistic in brackets) (p-value in parentheses)**	**Openness Included (test-statistic in brackets) (p-value in parentheses)**
g_t^M	0.15 {1.50} (0.15)	0.18{1.72} (0.10)
g_{t-1}^M	0.21 {2.06} (0.05)	0.23 {2.11} (0.04)
g_t^y	-0.50 {-1.45} (0.16)	-0.39 {-1.21} (0.23)
Δi_t	0.01 {2.11} (0.04)	0.01 {2.73} (0.01)
g_t^{SPWT}	0.15 {2.38} (0.02)	0.18 {2.48} (0.02)
OPENNESS		-0.16 {-2.49} (0.02)
R^2	0.51	0.58
Durbin-Watson stat	{1.55}	{1.83}
F-statistic	{5.16} (0.00)	{5.42} (0.00)
Jarque-Bera Test	{0.25} (0.88)	{0.49} (0.78)
Chow Breakpoint Test	(0.45)	(0.41)

[9] We followed 'Schwartz Information Criteria' for lag selection.

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