

An Analysis of the Determinants of Inflation in Nepal

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Introduction

Inflation, defined as a 'sustained and appreciable rise in the general level of prices', has been a challenging and controversial global problem. Especially in developing countries, persistent inflation has been the largest barrier to sustained economic growth and it has even been unavoidable and uncontrollable to a small open economy as ours.

Although opinions regarding the effect of inflation are diverse, it is believed that a 'mild dose of inflation' or 'optimum rate of inflation' can be a vehicle for allocating resources towards more productive sectors and can achieve full employment. But in a country like ours, where the supply of outputs is increasing very insignificantly but demand increasing excessively with increasing population at a higher rate, even a small degree of inflation may not be tolerable due to chances of price hike in future.

In a situation when economic activities remain stagnant regardless of the upturn in prices, even a small degree of inflation may not be justifiable. So the use of inflationary tools for rapid economic growth requires a careful attention. In this respect, present study attempts to investigate the main sources of inflation in Nepal and forwards some possible policy measures to combat it.

Objectives of the Study

The main objective of this study is to investigate the major determinants of inflation in Nepal by analysing both monetary and structural variables and to find out whether inflation is solely imported from India or also the domestic factors are responsible for it. More specifically, the objectives are:

1. To analyse the domestic factors responsible for inflation especially the monetary, fiscal as well as structural factors.
2. To analyse the external factors especially the Indian prices and international petroleum prices responsible for inflation in Nepal.

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3. To investigate how far there remains independent scope for domestic monetary and fiscal policy to check inflation in Nepal.

This study also aims at verifying the following hypotheses:

1. There is a significant positive relationship between the rate of inflation and the rate of changes in money supply as well as foreign exchange reserves, Indian prices, petroleum prices and government expenditure.

2. There is a significant negative relationship between rate of inflation and changes in real gross domestic products.

3. Expected rate of inflation aggravates the existing inflationary situation positively.

The hypotheses will be tested using statistical t ratios at .05 level of significance. In addition, the following assumptions have been made in the present study:

1. The country under study is supposed to be a small open economy whose export and import prices are determined in the world market i.e. the country is a price taker, not price maker.

2. The weighted consumer's price index for Kathmandu is supposed to represent the nationwide price situation.

3. The classical model assumptions of regression analysis are accepted while estimating the regression coefficients.

Methodology

In the theoretical framework, we find mainly three approaches to the study of inflation, namely, the demand pull (the quantity theory and the keynesian approaches), cost push or supply push and the structural approaches. Though the applicability of any of these theories in different countries is equally significant, we can not employ any one of the approaches to explain inflation in Nepal because of its particular characteristics. In a country like ours where money supply is rapidly increasing, where gross domestic product is stagnant despite a rapid growth in government expenditure and where Indian price situation has a direct impact upon the Nepalese price situation, the latter's economy being interlinked with the former's, a combination of monetary and structural approaches to inflation would be the most suitable approach to explain the sources of inflation in Nepal. Therefore, the explanatory variables in the model used to analyse the causes of inflation will be money supply (both narrowly and broadly defined), Indian prices (wholesale as well as consumer's prices), gross domestic product, government expenditure, foreign exchange reserves, petroleum prices and expected rate of inflation. Altogether the functional relationship in a single equation will be:

$$P_t = f \left(\frac{M_{1t}}{M_{1t-2}} / \frac{M_{1t-2}}{M_{1t-2}} / \frac{M_{2t}}{M_{2t-1}} / \frac{M_{2t-1}}{M_{2t-2}}, \text{GDP}_t, \text{GE}_t, \right. \\ \left. \text{IWP}_t / \text{IWP}_{t-1} / \text{IWP}_{t-2} / \text{ICP}_t / \text{ICP}_{t-1} / \text{ICP}_{t-2}, \text{FER}_t / \right. \\ \left. \text{FER}_{t-1} / \text{FER}_{t-2}, \text{PT}_t, \text{P}_t^* \right)$$

Where, P_t = rate of inflation; M_{1t} , M_{1t-1} , M_{1t-2} = rates of changes in current, one year lagged and two years lagged narrow money supply; M_{2t} , M_{2t-1} , M_{2t-2} = rates of changes in current, one year lagged and two years lagged broad money supply; IWP_t , IWP_{t-1} , IWP_{t-2} , ICP_t , ICP_{t-1} , ICP_{t-2} = rates of changes in current, three months lagged and six months lagged Indian wholesale and consumer's price indices; FER_t , FER_{t-1} , FER_{t-2} = rates of changes in current, one year lagged and two years lagged foreign exchange reserves; PT_t = rate of change in petroleum prices and P_t^* = expected rate of inflation.

The ordinary least square (OLS) method of regression analysis will be applied all over the study and the estimation of regression coefficients will be done by general matrix operation. Autocorrelation will be tested by Durbin-Watson (DW) test statistics.

Expected rate of inflation will be calculated by using Phillip Cagan's *Adaptive Expectational Hypothesis*. This hypothesis assumes:

$$X_t^* - X_{t-1}^* = \delta(X_t - X_{t-1}^*)$$

alternately,
$$X_t^* - X_{t-1}^* = \delta(X_{t-1} - X_{t-1}^*)$$

Where, δ is the coefficient of adaptive expectation, its value ranging from zero to unity. If δ is assumed to be equal to unity, then we have:

$$X_t^* = X_{t-1}$$

In our case, the result will be $P_t^* = P_{t-1}$ where P_{t-1} is one year lagged rate of inflation. Though this assumption is not free from limitation, yet various empirical studies (such as of Harberger, Bijan B. Aghevli and Mohsin Khan, Ichiro Otani etc. have followed this assumption to estimate the expected rate of inflation. So the assumption of unity value of expectational coefficient and then the proximation of expected rate of inflation with one year lagged rate of inflation is applied here too.

Empirical Analysis

The simple regression estimation of rate of inflation with money supply shows that one year lagged narrow money supply is the most effective variable for raising level of prices followed by one year lagged broad money supply. Current money supply neither narrow nor broad has any significant impact upon the level of prices showing a vivid situation of money illusion within the economy.

Similarly the regression estimation of rate of inflation with various Indian prices shows that current wholesale as well as consumer's prices have the highest explanatory power to explain inflation in Nepal rather than that of the Indian import and export price indices. Three months and six months lagged wholesale and consumer's prices have lesser impact in the Nepalese price situation than the current ones.

Table - 1
 Regression of Rate of Inflation (P_t) with changes in one year Lagged Narrow Money Supply (M_{t-1}), Current Indian Wholesale/Consumer's Price Index (IWP_t/ICP_t), Gross Domestic Product (GDP_t), Government Expenditure (GE_t) and Expected Rate of Inflation (P_t^*) from 1965-66 to 1979-80

S. No.	Constant	Coefficients on								
		M_{t-1}	IWP_t	ICP_t	GDP_t	GE_t	P_t^*	R^2	F	DW
1.	-0.396 (-0.17)	.4381 (2.56)*	.1988 (1.12)**					.541	7.0	1.59
2.	0.149 (.05)	.4165 (2.23)*	.1896 (1.02)**					.533	6.8	1.59
3.	-1.665	.4306 (2.57)*	.2273 (1.3)**	.506 (1.23)**				.596	5.4	1.77
4.	-5.115	.4862 (3.91)*			.3416 (2.68)*			.683	12.9	1.40
5.	-5.501	.4749 (3.67)*		-.2598 (-.56)	.4026 (2.36)*			.692	8.2	1.35
6.	-5.997	.3647 (2.67)*	.2494 (1.83)*		.367 (3.12)*			.756	11.4	2.29
7.	-6.211	.3582 (2.61)*	.2443 (1.72)**	-.2064 (-.48)	.4149 (2.64)*			.762	8.0	2.32
8.	-6.02	.3558 (2.47)*	.2565 (1.69)**	-.1968 (-.44)	.4253 (2.54)*			.765	5.9	2.31

Figures in parentheses indicate corresponding t-ratios.

* Significant at .05 level of significance.

** Significant at 0.1 level of significance.

Moreover, government expenditure shows significant positive impact upon the level of prices, so is the impact of petroleum prices though in a smaller degree. But gross domestic product has shown insignificant negative impact upon the level of prices thus indicating a failure of the supply of output to sterilise price hikes.

Expected rate of inflation, that is, the expectation of price hike in future, seems quite ineffective cause of price rise thus showing that expectation of future price situation has a little to do with the current price situation. On the other, foreign exchange reserves shows no significant direct impact upon the level of prices. Its impact might be reflected in price level indirectly via the change in money supply as that changes the monetary base and with given money multiplier changes money supply situation accordingly. With this provision, this variable is assumed no more necessary to be included into the estimating regression equation. Now the explanatory variables are reduced to one year lagged narrow money supply, current Indian wholesale/consumer's price index, government expenditure, gross domestic product, petroleum prices and expected rate of inflation. Major findings of the regression estimation are given in Tables 1 and 2.

From the various estimated regression equations the inference can be drawn that money supply, Indian prices and government expenditure are the most responsible factors causing inflation and expectation of future inflation has no significant impact upon the current price situation. Similarly the coefficient on GDP shows that it has insignificant role in stabilizing the level of prices.

Since the price rise of petroleum products is visualized significantly only after 1970s, a separate study covering a period from 1970-71 to 1979-80 is done here to assess the effect of petroleum price changes in the general level of prices. The explanatory variables are the same as in earlier analysis but petroleum prices is included here as an additional explanatory variable to analyse the impact of increasing petroleum prices on the rate of inflation. The findings are as illustrated below.

In this analysis also, money supply and Indian prices are the most responsible factors for raising the level of prices in Nepal and GDP has no power to sterilise the price rise. Government expenditure and expected rate of inflation show not so strong power in raising the prices. Petroleum prices when included with Indian wholesale prices show no impact upon the price level but when excluded from the Indian prices, show significant impact upon the level of prices. This indicates that the impact of petroleum prices in Nepalese prices is reflected via the impact of Indian prices. In this context, it is to be noted that Indian price situation also is unaffected by the international petroleum prices.

Findings

The macro study of inflation and its determinants leads to the conclusion that both domestic as well as external factors are responsible for distorting the price situation in

Table - 2
 Regression of Rate of Inflation with changes in one year Lagged Money Supply ($M1_{t-1}$), Indian Wholesale Prices (IWP_t),
 Gross Domestic Product (GDP_t), Government Expenditure (GE_t), Petroleum Prices (PT_t) and Expected
 Rate of Inflation (P_t^*) from 1970-71 to 1979-80

S.No.	Coefficients on										\bar{R}^2	F
	Constant	$M1_{t-1}$	IWP_t	GDP_t	GE_t	PT_t	P_t^*	R^2				
1.	.776	.326 (2.14)*	.349 (2.2)*	-.159 (-.34)				.76	.64		6.31	
2.	-.81	.334 (2.23)*	.336 (2.12)*		.069 (.34)			.76	.64		6.3	
3.	.396	.332 (2.17)*	.317 (1.41)**			.017 (.16)		.75	.63		6.2	
4.	2.17	.332 (1.95)*		-.402 (-.74)		.143 (1.67)**		.70	.55		4.7	
5.	-1.19	.355 (2.46)*	.337 (2.25)*				.169 (.86)	.78	.67		7.2	

* Significant at .05 level of significance

** Significant at 0.1 level of significance

Nepal. The empirical analysis of the rate of inflation and money supply shows that current money supply has no impact upon the price level. This is sufficient to conclude that 'money illusion' is actively operating in Nepalese economy. But the illusion ends in about a year as one year lagged money supply has significant effect upon the level of prices. But after about a year the effect seemed to be nullified, thus stating no longer distributed lag in the effectiveness of monetary variables.

Moreover, the relatively low impact of broad money supply on the rate of inflation than the narrow one indicated that broad money supply has got not so much liquidity in the economy because of the underdeveloped banking and monetary system.

The Nepalese price situation is found highly associated with Indian prices. The shortage in food supply despite the slogans of Green Revolution, the increasing import price due to increasing international market price and rapidly increasing population have pushed the Indian prices up and this situation is automatically adopted by Nepal by importing inflation in terms of higher import prices. The economic dependence of Nepal with India due to structural barriers and the provision of free trade and transit facility between the two countries has made the domestic price situation highly sensitive to Indian prices.

The effectiveness of gross domestic product in stabilizing the price level is insignificant. Since the supply of output is insufficient to satisfy the demand increased due to higher government expenditure, the aim of increasing the gross domestic product by huge government expenditure has rather been turned in accelerating the inflationary tempo.

Petroleum prices is found to have two-way impact upon the domestic price situation. Firstly, it affects the general price level by increasing the cost of transportation and secondly, it hits the Indian price level and correspondingly the Nepalese price level too.

The expected rate of inflation that has been found to distort the price level of various countries seemed ineffective in our case. This may be due to either our assumption regarding the unity value of expectation coefficient is inappropriate, that is, the lagged changes in the rate of inflation could not represent the expected rate of inflation, or that expectation of future prices does not affect the current price situation because of the underdeveloped nature of the economy characterised by non-monetization, low purchasing power, money illusion at existence and almost zero level of saving restricting people from increasing demand in anticipation of further price rise.

Recommendations

The empirical analysis leads us to the conclusion that inflation is neither solely imported from abroad nor created within the economy. Since both the internal and external factors are responsible for inflation in Nepal, there exists some room for independent policy that might reduce the inflationary pressure contrary to the conclusion of Maxwell that ".....inflation in Nepal is solely a result of inflation in India; no room exists for independent policy in Nepal".

Though there are generally three types of policy options to check inflation, namely: monetary, fiscal and direct control measures; the feasibility, applicability and efficacy of these different methods of price stabilization is to be examined in the context of the economy's characteristics. The efficacy of monetary policy in stabilizing prices in Nepal is seriously limited by the fact that it is unable to control the expansion in money supply which is strongly determined by balance of payment position of the country. Open market operation as a key tool of monetary policy is limited by underdeveloped financial market and the possibilities for sterilization of balance of payment surplus is minimum. So the control of money supply and then the price level through monetary policy is seriously limited.

Fiscal policy on the other hand, aimed at increasing output and real income by stabilizing the price level has also limitations. Since gross domestic product has remained constant despite of huge investment from the government sector, excess demand generated by increased money income needs to be curtailed through taxation. But the scope of taxation too is limited by operational difficulties.

The success of direct control measures of inflation depends upon the efficacy of the government working machinery as well as upon the economic structure of the country. Therefore, not a single policy is sufficient to check inflation in Nepal but a combined implementation of all these policies may be a more meaningful effort to combat the problem. Some of the important policies that can be adopted to check inflation in Nepal may be the followings:

1. Gross Domestic Product should be raised by increasing the share of non - agricultural sector if agricultural sector is beyond our control.
2. Government expenditure should be allocated towards more productive sector and the dependence of the government budget on foreign sources should be minimized, the resource gap being fulfilled by the mobilization of internal resources
3. The dependency of the government in banking sector only for raising internal loan should be diverted to the non-banking sector so that loan raised might not be inflationary.
4. The effect of the Indian prices be paralyzed through curtailing the import from India, border control, trade restriction by developing the system of tariff, quota and licensing. Trade diversification policy may help a lot in paralyzing the impact of Indian prices.
5. A progressive tax system should be developed and an efficient tax administration system is equally desirable which should be capable of absorbing the excess purchasing power of the higher income group.
6. Bufferstock programme of necessary consumption items should be managed from the government side so that the shortage could be minimised. The national economy needs to be

integrated by the modes of transport and communication so that the disparity in supply and prices could be eliminated.

7. The economy should search for the alternative of petroleum imports. The increasing price as well as quantity of petroleum imports may seriously affect the domestic price situation. Proper utilization of hydro-electricity as a source of energy can minimize this import and thus domestic price level can be stabilized.

Besides all these, unless government carries on its responsibilities efficiently regarding price rise and unless government policies regarding monetary, fiscal and direct control measures are applied simultaneously, no inflation can be checked.

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