



Inflation-Unemployment Trade Off: Evidence from Pakistan

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I. INTRODUCTION

Inflation and unemployment are the most common and widely discussed economic problems because both impact the common man life. High economic growth, price stability and low unemployment are the most desirable macroeconomic goals. It is less likely that these goals are achieved simultaneously. Inflation is a condition of continually and rapidly rising price level that persists over a sustained period of time. When there is inflation, value of money falls. A low inflation rate indicates that average price of goods would not rise as high. Inflation may be measured by a number of price indices.

Consumer price index (CPI) is the most closely watched index of prices and is reported in the media³. When inflation is regarded as a problem, it may imply that the inflation rate is too high and rising. The costs, consequences or effects of inflation depend on whether the inflation is *anticipated* or *unanticipated*. Inflation is anticipated when prices increase at a rate which all economic agents (consumers, workers, investors and firms) expect to rise, or it may be *unanticipated*, when the prices

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³ In Pakistan four types of price indices are used to measure changes in the price level. They are CPI (consumer price index), WPI (wholesale price index), SPI (sensitive price indicator) and GDP deflator. CPI is the price of a fixed basket of goods and services relative to the same basket in some base year. GDP deflator is based on the commodities and a service produced in the economy and is an index of domestically produced inflation. WPI measures the cost of goods leaving factories for the domestic market. In Pakistan WPI includes food, raw material, fuel and lubricants, manufacturing and building materials. The SPI coverage is also a CPI but its coverage is limited to much fewer commodities than CPI. CPI has been traditionally considered to be a better indicator of inflation in Pakistan (Government of Pakistan (GOP) 1997-98, 74).

increase which are not expected or are larger than expected. Following major costs are associated with inflation:

1. Inflation erodes the value of money that constrains people and firms to minimize their holding of cash. Time and effort (e.g. going to the bank or ATM to make withdrawals every week instead of twice a month and firms may add staff to the accounting department to pay their employees more often) so spent is called *shoe-leather costs*.
2. When prices are rising, sellers must use resources to change nominal prices. These are called *menu costs*. Society's output of goods and services is reduced by devoting resources to these activities.
3. Inflation creates balance of payments (BoPs) problems. Country loses international competitiveness vis-à-vis its important trade partners that breeds BoPs deficit. Exchange rate fluctuates considerably that further aggravates inflation rate.
4. Inflation reduces the real value of both monetary assets and liabilities and increases the real value of real assets. Debtors gain, creditors lose and the wealth is redistributed from creditors to debtors. Those that lend or save at fixed interest rate (creditors) and those whose nominal income is fixed in nominal terms are hurt by unanticipated inflation. The debtors or who must make fixed nominal payments are helped by unanticipated inflation.
5. Unanticipated inflation imposes costs by generating a sense of uncertainty. People are unable to make plans for the future and as a consequence, economic decision making becomes inefficient.

Demand-pull and cost push is the two major theories that explain the causes of inflation. The basic idea behind *demand-pull inflation* is that the price-level rises when demand in the economy exceeds its productive capacity. On the other hand, *cost push inflation* raises prices by raising costs of production. Wage-push inflation resulting from wages pushing up prices and supply-shock inflation resulting from increase in non-labour input prices, cause costs and prices to go up are other two types of cost-push inflation. High rate of money growth and the presence of persistent government budget deficits are the potential sources of inflation. Both Keynesian and monetarist believe that high rate of money growth is a major cause of inflation. Furthermore, prices of imported goods and services are also, for most countries, a major source of inflationary supply-side shocks. Import prices may rise either because supply prices rise or, more generally, because depreciation of the importing country's currency, *vis-à-vis* other currencies, makes imports more expensive.¹

¹ If the inflation is not taken care of adequately, it may twist into hyperinflation – a volatile and ostensibly unmanageable inflation in which money loses value very rapidly. Philip Cagan, "The Monetary Dynamics of Hyperinflation", in Milton Friedman (ed), *Studies in the Quantity Theory of Money*, Chicago: University of Chicago Press, 1956, regarded an inflation rate of 50 per cent per month (12,875 per cent per year) as representing the dividing line between inflation and hyperinflation.

Unemployment refers to a situation when someone is seriously seeking a job but unable to find even at the prevailing market wage rate. The classical model of the labour market provides a link between wage rate and the level of employment. This model is based on the strong assumption that the labour market is always in equilibrium; all workers who are willing to work are able to find jobs at the prevailing wage rate. The implication is that there is no possibility of involuntary unemployment. This is not supported by the real world experience. There is always some employment even when the economy is performing well and new jobs are being created. Why is unemployment apparently a permanent feature of the economy? Frictional and structural unemployment prevent the unemployment rate from ever reaching zero. All workers as well as jobs are not identical. Workers are in search of better jobs; firms look for suitable workers. The frictional unemployment is the unemployment that exists when workers shift between jobs or look for suitable jobs. There are workers who remain unemployed for a long time and do not seem to search for work and do not generally find suitable jobs. This is called structural unemployment that exists even when the economy is not in recession. The natural rate unemployment arises from the labour market frictions that exist when the labour market is in equilibrium. The difference between actual and natural rate of unemployment is called *cyclical unemployment*.¹

The costs of unemployment are not less distressing than inflation. Loss of output is the major cost of unemployment because the unemployed labour force does not add to the productivity. Since the unemployed do not pay taxes, tax-payers of the society also bear some of the output cost of the unemployed. Okun's law provides an estimate of the output cost of the unemployment. Personal or psychological cost faced by the unemployed workers and their families is another cost associated with unemployment (Abel and Bernanke 2005, Dornbusch and Fisher 1990).

Society faces a short-run trade-off between unemployment and inflation. If policymakers inflate aggregate demand, they can shrink unemployment only at the cost of higher inflation. If they lessen aggregate demand, they can decrease inflation at the cost of temporarily higher unemployment. Low inflation and high employment in a country reflect the success of the government economic policies. *Stagflation* is the other extreme when the economy stagnates at low employment and increasing inflation. The nature and costs of inflation and unemployment discussed above demonstrate the vital impact these problems can have on the economy and society.

¹ Unemployment in Pakistan consists of all persons of 10-years of age and above who during the reference period were without work that is not in paid employment or self-employment; and currently available for both and those not currently available for some reasons (GOP 2008-09, 187).

Inflation and unemployment¹ scenario in Pakistan is depressing and alarming. Aggregate demand in Pakistan has increased due to increase in income which has also been increased by a perceived wealth effect. Real estate value has immensely increased and incentives to save have diminished. Increase in administered prices and excessive government borrowing from the central bank has added fuel to the inflation fire. Unprecedented rise in oil prices that increased from \$55 per barrel in 2007 to over \$120 per barrel (118.18% increases) in May 2008 and depreciation of dollar against major currencies resulted in huge import cost in countries like Pakistan and passing on of this cost to consumers propelled inflation. The dilemma is that the general prices rise with the increase in oil prices, but when the oil prices fall general domestic prices are not reduced implying that the response of the general domestic prices to oil prices is asymmetric (GOP 2007-08).

Unemployment situation in Pakistan has aggravated because of rapid population growth, lacklustre economic growth, fiscal indiscipline, escalating debt-servicing and non- development expenditure and these have reinforced each other culminating in significant reduction in development expenditure that has adversely affected Pakistan economic development and poverty reduction resulting in aggravating employment situation.² It is against this background that this paper examines how inflation and unemployment are related in Pakistan. PIDE (2010) shows that a vast majority of people expect higher inflation than the current year target (9 percent). The results indicate that oil and food prices are the major contributing factors for high inflation.³

Rest of the paper is structured as follows. Section II describes the methodology and data sources. Section III carries a brief review of studies. Section IV contains the empirical results and conclusions have been given in the final section.

II. METHODOLOGY AND DATA

New Zealand-born economist A.W Phillips initiated the idea of a trade-off between inflation and unemployment in a 1958 article in which he published a comprehensive study of wage behaviour for the 97 years (1861-1957) United Kingdom data on unemployment and nominal wage growth. Phillips (1958) showed evidence of a

¹ GOP has spent Rs. 3 billion on internship programme that pays Rs.10, 000 to the unemployed youth that has benefited 27000 educated persons (Finance Minister Budget Speech, June 05, 2010).

² Finance Minister in his budget speech (June 5, 2010) expressed concern over debt-servicing rock climbing to 55% of the GDP in fiscal year 2010-11

³ Unfortunately, the survey did not consider the excessive government borrowing from the central bank. Government has borrowed Rs.30 billion in excess of the agreed amount. Government has to return Rs.230 billion by June 30, 2010 to the central bank. Fiscal indiscipline is also a major cause of rising inflation in Pakistan.

negative relationship between the unemployment rate and the changes in nominal wages for British data.

It was later used by the economists as inflation- unemployment trade-off. This negative relationship between inflation and unemployment is known as the Philips Curve Following Dornbusch and Fisher (1990), the original Philips curve can be written as

$$g_w = -\beta (U - U_n) \quad (1)$$

Where

$$g_w = dW/W = (W_t - W_{t-1}) / W_{t-1}$$

W_t = wage in period t

W_{t-1} = wage in period t-1

U = unemployment rate

U_n = natural rate of unemployment

β = a constant that measures the responsiveness of wages to unemployment

Equation (1) states that the wages decline ($g_w < 0$) when unemployment rate exceeds the natural rate ($U > U_n$), increasing ($g_w > 0$) when the unemployment rate is less than the natural rate ($U < U_n$) and are stable ($g_w = 0$) when the unemployment rate is equal to the natural rate ($U = U_n$).

The Philips Curve implies that wages and prices adjust slowly to changes in aggregate demand. This can be seen

$$W_{t+1} = W_t [1 - \beta (U - U_n)] \quad (2)$$

Equation (2) shows that for wages to rise in current period over previous period, unemployment must fall below the natural rate. Although original Philips curve described the inverse relationship between the unemployment rate and wage inflation the term 'Phillips curve' gradually came to describe the relation between the inflation rate and the unemployment rate. Therefore, equation (1) can be written as

$$\pi = -\beta (U - U_n) \quad (3)$$

Where π is inflation rate

Milton Friedman (1968) and Edmund Phelps (1970) questioned the logic of the Phillips curve and argued that the Philips curve would shift overtime as workers and firms became used to and began to expect continuing inflation. On the basis of economic theory they argued that there should not be a stable negative relationship between unemployment and inflation instead a negative relationship between the unanticipated inflation and cyclical unemployment.

They did not expect the notion of a long-run trade-off between inflation and unemployment. The relationship between unanticipated inflation and cyclical unemployment can be written as

$$\pi - \pi^e = -\beta (U - U_n) \quad (4)$$

Where

$\pi - \pi^e$ = unanticipated inflation

$U - U_n$ = cyclical unemployment

π^e = expected or trend inflation

β = a positive number that measures the relationship between unanticipated inflation and cyclical unemployment

This equation expresses the idea that unanticipated inflation will be positive when cyclical unemployment is negative, negative when cyclical unemployment is positive, and zero when cyclical unemployment is zero. We can write the equation (4) as follows

$$\pi = \pi^e - \beta (U - U_n) \quad (5)$$

Equation (5) describes the expectations-augmented Phillips curve which states that actual inflation, π , exceeds expected inflation, π^e , if the actual unemployment rate, U is less than the natural rate, U_n , and the actual inflation is less than expected inflation if the actual unemployment rate exceeds the natural rate.

Extensive theoretical and empirical studies have been done on the Phillips curve. Several modifications have been made in the Phillips curve. Blanchard (1997) has provided a comparatively recent formulation of the Phillips curve given below

$$\pi_t - \pi_t^e = \beta_1 (U_t - U_n) + \mu_t \quad (6)$$

Where

π_t = actual inflation rate at time t

π_t^e = expected inflation rate at time t , the expectation being formed in period $t-1$

U_t = actual unemployment prevailing at time t

U_n = natural rate of unemployment at time t

μ_t = stochastic error- term

Since it is difficult to observe π_t^e directly, it can be assumed that $\pi_t^e = \pi_{t-1}$ which implies that inflation expected in the current year is the inflation rate that prevailed in the last year.

After making this assumption equation (6) can be written as:

$$\pi_t - \pi_t^e = \beta_1 + \beta_2 U_t + \mu_t \quad (7) \quad \text{Where}$$

$$\beta_1 = -\beta_2 U_n$$

Equation (7) hypothesizes that the inflation change between the two periods is linearly related to the current unemployment rate. The expected signs of the parameters are: $\beta_1 > 0$ since β_2 is negative and U_n is positive and $\beta_2 < 0$ because of inverse relationship between inflation and unemployment

But it is often argued that the rate of inflation depends not only on the expected inflation rate and the level of the unemployment rate but also on the change in the unemployment rate. At the same level of the unemployment rate, inflation will be

different depending on whether the unemployment is rapidly falling or sharply increasing. It is likely that the unemployment is declining in one period, and not declining at all in another period. We expect higher inflationary pressure or less rapidly falling inflation in the former case than in the latter.

This extension is shown in equation (8) below

$$\pi_t = \pi_t^e - \beta (U_t - U_n) - \psi (U_t - U_{t-1}) \quad (8)$$

In this equation we add another term $\psi (U_t - U_{t-1})$ to the Philips curve. *The coefficient ψ measures the extent to which change in unemployment ($U_t - U_{t-1}$) affects inflation.* The larger is ψ , the more important is the effect of the changing unemployment on the inflation rate. In this extended form, high unemployment still exerts dampening effects on inflation but they are now modified by the change-in- unemployment effect. Equation 8 is the *Extended Philips Curve* which suggests that there is a solid trade-off that is directly useful for policy purpose. The more rapid the reduction in unemployment, the fewer disinflations is achieved at each unemployment level. Even if unemployment is very high, inflation falls little if the economy is moving too rapidly out of the recession. Conversely a slow recovery reinforces the inflation-dampening effects of high unemployment.

Furthermore, it has been concluded based on a comprehensive review of alternative theoretical approaches that a reduced-form Phillips curve structure is the most appropriate for the analysis of inflation-unemployment trade-off. Because this approach offers a direct link regarding the inflation and unemployment relationship and is in agreement with a range of structural approaches (Richardson *et al.*, 2000; Laubach, 2001). We estimate equation (7) by the method of ordinary least squares (OLS) and equation (8) by the method of non-linear least squares (NLS).¹ Data on consumer price index and unemployment were collected from Government of Pakistan (GOP), economic survey (various issues) for the period 1973 -2010.

III. REVIEW OF STUDIES

A large number of studies have been done in developed and developing countries to see the validity of the Philips curve. During late 1950s and the 1960s many studies examined the inflation and unemployment relationship in many countries and majority of the studies supported the inverse relationship between the two variables. Policy implications of these findings were much debated. Initially the Philips curve seemed to offer policymakers a *menu* of combinations of inflation and unemployment from which they could choose. During 1960s some economists were of the view that policy makers could keep the unemployment rate low by accepting a modest amount of inflation. This belief appeared to be supported during the 1960s when rising inflation was accompanied by falling unemployment. In the following decades the negative relationship failed to hold (Abel and Bernanki 2001).

¹ See for detail Goldberger (1991), Pindyck and Rubinfeld (1998), Maddala (2002)

Hasan (1988) has provided evidence on the existence of a short-run Phillips curve for Pakistan for the period 1972-I to 1981-IV. He also found the existence of a long-run trade-off between excess demand for labour and inflationary expectations. He has reported that structural evidence indicated a substantial degree of inertia in commodity prices in Pakistan within the context of a complete rational expectations macroeconomic model. The latter result is probably due to the rigidities present in the labour market in terms of the existing long-term wage contracts. Laubach (2001) has examined several specifications to get precise estimates of NAIRO (non-accelerating rate of unemployment) for seven industrialised countries. He has concluded that a model based only on the Phillips relations leads to very imprecise estimates including information from unemployment in addition to inflation in the NAIRO estimates considerably increases the precision of the estimates.

Wall and Zoega (2002) provide micro-econometric evidence based on USA data on wage-inflation and employment and report a non-linear relationship suggesting an increase in wage-inflation increases inflation at an increasing rate. Bhattarai (2006) has reported that when OECD countries are taken together some evidence on Phillips curve is found but such evidence disappears when one country is taken at a time and apparent trade-off often reported between unemployment rate and inflation for a country is found to be spurious for the period 1981- 2002 in this study. He argues that higher unemployment rates in OECD countries cannot be explained only by macro aggregate demand or supply factors but requires micro factors. Strong evidence exists for a lack of a trade-off between inflation and unemployment in recent years as most countries have adopted inflation targeting and supply side focused policies for macroeconomic stabilisation.

Schmidt (2006) has reported that empirical studies find an inflation unemployment trade-off for Germany. But the Phillips curve pattern is changing over time. This seems to be due to labour market institutions. Recent labour market reforms in their entirety seem to have contributed to a better functioning of the German labour market. Benigno and Ricci (2008) offered a theoretical foundation for the long-run Phillips curve in a modern frame work. According to them the trade off is virtually nonexistent at high inflation rates while it becomes relevant in a low inflation environment. The relationship shifts with several factors and in particular with the degree of macroeconomic volatility. In a country with significant macroeconomic stability the Phillips curve is virtually vertical also at low inflation. However, a country with moderate to highly volatility may face a substantial cost in terms of unemployment if attempting to reach price stability. Downward nominal rigidities have been advocated for a long time as a justification for the Phillips curve but with weak theoretical and empirical support. Puzan (2009) investigated the Philips curve for four ASEAN countries (Philippines, Thailand, Indonesia and Malaysia) using data from 1980 to 2005. The relationship of interest rate, exchange rate and supply shocks to inflation were also examined. He reports the absence of a stable trade-off between

unemployment and inflation in the four countries and also concluded that the variables which could help control inflation were different for the four countries.

IV. EMPIRICAL RESULTS

Table 1 shows the results of equation (7) estimated by OLS for Phillips curve for different time periods. The empirical results for the first three periods (1974-2010, 1974-82, 1974-92) and the last period 2000-2010 show that the Phillips curve holds in Pakistan because the unemployment coefficient is negative and significant. The results indicate that if the unemployment rate goes down by 1 percentage point, the change in the inflation rate goes up by 0.14, 0.23, 0.28 and 0.71 percentage points and vice versa for the above-mentioned four periods. For other periods (1981-2000 and 1981-2010) though there is negative relationship between inflation and unemployment, the unemployment coefficients are not significant.

Table 1: $\pi_t - \pi_{t-1} = \beta_1 + \beta_2 U_t + \mu_t$

Period	β_1	β_2	R^2	DW
1974-2010	0.23 (2.20)*	-0.14 (-2.20)*	0.31	1.98
1974 - 82	0.32 (-2.41)*	-0.23 (-2.41)*	0.39	1.84
1974-92	0.37 (4.04)	-0.28 (-3.66)*	0.42	1.98
1981 - 2000	0.04 (0.18)	-0.01 (-0.09)	0.18	2.04
1981-2010	0.16 (0.88)	-0.09 (-0.87)	0.10	2.007
1991-2010	0.78 (1.53)	-0.42 (-1.53)	0.15	1.92
2000- 2010	1.36 (1.68)	-0.71 (1.75)**	0.22	2.09

Note: figures in both Tables are t-statistics and * is 5% and ** is 10% level of significance

Table 2 : $\pi_t = \pi_t^e - \beta (U_t - U_n) - \psi (U_t - U_{t-1})$, dependent variable is price inflation

Period	π_t^e	β	ψ	U_n	R^2	DW
1974- 2010	0.97 (18.03)*	4.16 (1.53)	-7.7 (-1.75)**	5.68	0.56	2.05
1974-2000	0.96 (13.81)*	4.15 (1.45)	-12.29 (-1.70)**	3.36	0.70	1.98
1981 – 2010	0.97 (5.30)*	4.77 (1.34)	-8.30 (-1.17)	5.68	0.31	2.04
1991 – 2010	0.96 (18.65)*	12.04 (1.62)	-9.16 (-1.09)	6.41	0.33	2.13

Table 2 shows results of equation 8. The expected inflation is significant for all periods (Table 2). The average natural rate of unemployment is 5.30. The difference between current and natural rate of unemployment (cyclical unemployment) is not significant. However, difference between current and lagged unemployment is significant for two periods. The β coefficient is positive suggesting that $U_t < U_n$. One unit change in U_t and U_n brings about a change of 4.15 units in current inflation for 1974 - 2010 and 1974 -2000 periods. The ψ coefficient is negative for all periods implying that the current unemployment (U_t) exceeds the lagged unemployment (U_{t-1}) which means that unemployment has been increasing at an increasing rate. Since ψ is larger for all the periods the effect of the changing unemployment causes a noteworthy change in current inflation.

V. CONCLUSION

High economic growth, price stability and low unemployment are the most enviable macroeconomic goals. The success of government policies is reflected in low inflation and low unemployment. Inflation refers to a condition in which the price level is continually rising at a rapid rate. Inflation is regarded as a problem; when the inflation rate is too high and rising. Many costs are associated with inflation and therefore, the control of inflation becomes inevitable. High rate of money growth and the presence of persistent government budget deficits are the potential sources of inflation besides supply-shocks and rise in import prices. Unemployment results from lack of employment opportunities and is a permanent feature of the economy. The costs of unemployment are not less distressing than inflation. Loss of output and personal or psychological cost faced by the unemployed workers are the major costs of unemployment. The nature and costs of inflation and unemployment can have vital impact on the economy and society.

Unemployment situation in Pakistan has aggravated because of rapid population growth, lacklustre economic growth, fiscal indiscipline, escalating debt-servicing and

non- development expenditure which have adversely affected Pakistan economic development and poverty reduction. Import prices and fiscal indiscipline are the major causes of inflation. A.W Philips initiated the idea of a trade-off between inflation and unemployment and showed evidence of a negative relationship between the unemployment rate and the changes in nominal wages for British data. It was later used by the economists as inflation- unemployment trade- off. Extensive theoretical and empirical studies have been done on the Phillips curve. Several modifications have been made in the Phillips curve. We have used the latest versions of the Phillips curve for Pakistan.

The empirical results show that the Phillips curve holds in Pakistan. The reduced-form Phillips curve structure reveals that the expected inflation is significant for all periods. The current unemployment exceeds the lagged unemployment which means that unemployment has been increasing at an increasing rate and this difference causes a significant change in current inflation.

Inflation and unemployment are major economic problems which must be seriously addressed. However, the resolution of economic problems crucially depends on good governance. Lack of governance or bad governance has remained the crux of the problem. Since the inception of the country foreign policy objectives have over-eclipsed the economic decision- making. Unless foreign policy objectives are rationalised and good governance is assured, economic problems will loom large and haunt the policy- makers and the resolution of economic problems may assume unrelenting façade.

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