Determinants of Inflation and Population Growth in Pakistan: A Time Series Approach

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Abstract

Probably determined ascent in value levels antagonistically influences the financial execution of any nation. The objective of every last Government is to keep up low and moderately stable levels of expansion. This study dissected the real determinants of swelling in Pakistan by utilizing time arrangement information from 1981 to 2015. The study utilized Johansen-Co incorporation approach to test for the presence of long run relationship between the variables. The Co-coordination relapse so far considers just long-run property of the model. This study reasoned that swapping scale, expansive cash and populace development positively affect swelling in long run. Then again unemployment has negative impact however is not huge. The cash coefficient is 0.01% suggesting that one percent expansion in cash supply prompts 1% expansion in value level and it is the most noteworthy component of swelling in Pakistan's economy.

Keywords: Inflation, Consumer Price Index, Population Growth, Time Series Model. Johnson Co-Integration Approach

Introduction

An ascent by and large level of costs in any economy is called swelling. In Pakistan swelling is measured by four records. The first and most imperative is purchaser value file (CPI), it quantifies the retail costs of an altered business sector wicker container of 487 products and administrations devoured by urban family in 40 noteworthy urban areas of Pakistan on month to month premise, Second list is wholesale costs index (WPI) which measures entire deal costs of around 106 things in Pakistan from 18 noteworthy urban areas. Third is delicate value index (SPI) which indicates week after week changes in costs of 53 chose thing of everyday use by those family unit whose month to month salary in base year (assume 2000-2001 as base year) extended from Rs.3000 to Rs.12, 000 or above while the last one is GDP deflator which measures the value variety in products and administrations delivered domesically. In long run, the different records (SPIs, WPIs and the CPI) demonstrate very nearly a comparable pattern. The number of inhabitants in Pakistan was 33.74 million in 1951, 42.88 m in1961,65.31m in 1972, 84.25 m in1981 and 132.35m in 1998 as indicated by five enumeration reports led in Pakistan from 1951 to 1998 .In 1951 it was the fourteenth most crowded nation on the planet. Its populace has expanded roughly5.5-fold achieving 191.7 million in 2014-15. Pakistan is currently the 6th most crowded nation on the planet (Government of Pakistan, 2015). The present populace development rate is 1.92 percent. As indicated by one assessment, Pakistan will turn into the fifth most crowded nation in 2050 at its present rate of

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populace development (Government of Pakistan, 2013). This situation displays a photo that could obliterate for the nation's as of now rare national assets.

Causes and Impact of Inflation on Economy of Pakistan

Pakistan's normal swelling rate was 7.92% from 1957 until 2016, achieving untouched high 37.81% in December 1973 and a record low of - 10.32% in February 1959.In 1970's normal expansion rate in Pakistan rose to 11.9% because of oil stuns, In 1980's swelling rate dropped to 7.5% for every annum by and large, In 1990's expansion again rose to 9.7% because of money related development, decrease in absolute variable profitability and absence of financial control while from 2000 till 2008 normal expansion rate was 6.4%. Swelling rate in Pakistan is accounted for by Pakistan Bureau of Statistics (FBS) and measured by shopper value record.

The reasons for swelling in Pakistan are partitioned into two gatherings first sort is interest pull expansion when amassed interest for all reasons (utilization, venture and government segment) surpasses the supply of products at current costs) which might be because of simple fiscal approach, shortage financing, increment in specialist's settlements, remote monetary help, exhibit impacts, theory, storing, development of houses, populace development, increment in wages and compensations in yearly spending plan and dark cash. While the second cause is cost push expansion which is brought about by expanding the expenses of components of generation which incorporates rising costs of imported products, increment in backhanded assessments, deterioration of rupee and rising bolster costs of horticultural wares.

Pakistan's economy developed at a genuinely noteworthy rate of 6% every year through the initial four many years of country's presence. Regardless of fast populace development amid this period, per capita salaries multiplied, swelling stayed low and neediness declined from 46% to 18% by late 1980's. This solid financial execution was kept up through a few wars and progressive regular citizen and military governments in 1950's, 60's, 70's and 80's until the decade of 1990's, currently suitably recognized as the lost decade.

In 1990's, monetary development was between 3% and 4%, neediness rose to 33%, expansion was in twofold digits and the outside obligation mounted to almost the whole GDP of Pakistan as the administrations of Benazir Bhutto (PPP) and Nawaz Sharif (PML) played a game of seat juggling. Before Sharif was expelled in 1999, the two gatherings had directed 10 years of debasement and fumble. In 1999 Pakistan's aggregate open obligation as rate of GDP was the most noteworthy in South Asia 99.3 % of its GDP and 629 % of its income receipts, contrasted with India (47.2% and 384.9% separately in 1999).

After a moderately quiet yet financially stagnant decade of 1990's, the year 1999 brought a bloodless upset drove by General Pervez Musharraf, introducing a time that prompted dramatically increasing of the national GDP and emotional extension in Pakistan's urban white collar class.

Pakistan got to be one of the four quickest developing economies in the Asian locale amid 2000-07 with its development averaging 7.0% every year for a large portion of this period. As a consequence of solid financial development, Pakistan succeeded in decreasing neediness by one-half, making right around 13 million employments, splitting the nation's obligation trouble, raising outside trade stores to an agreeable position, propping the nation's conversion standard, reestablishing speculators' certainty and most vital taking Pakistan out of the IMF Program. The nation's genuine GDP expanded from $60 billion to $170 billion with per capita pay ascending from under $500 to over $1000 amid 2000-07. High development, low expansion and government's social approaches added to lessen neediness and enhanced numerous social pointers (see MEFP, November 20, 2008, Para 1).

The Zardari-Gilani government acquired a moderately stable economy on March 31, 2008. It acquired remote trade stores of $13.3 billion, conversion scale at Rs 62.76 for every US dollar, expansion at 20.6% and nation's obligation weight was on declining way. The administration itself recognized that "the macroeconomic circumstance crumbled fundamentally in 2007/08 and the initial four months of 2008/09 attributable to unfavorable security improvements, expansive exogenous value stuns (oil and nourishment), worldwide money related turmoil and approach in real life amid the political move to new government (Para 3 of the MEFP, November 20, 2008).

Pakistan is a creating nation and its populace development is more than its GDP development rate. It is additionally a bigger merchant of oil so if there is overall variance in oil costs it is prone to influence Pakistan the most. The economy of Pakistan has endured a great deal in past decade because of interior legislative issues, quickly developing populace, declining level of outside speculation. Expansion not just influences sectoral portion, circulation of pay yet it likewise quicken neediness. Inflation is alluring on the off chance that it is moderate, i.e., 2% to 3% yearly yet in the event that it crosses past that breaking point then it is undesirable since it prompts the loss of welfare and makes terrible effect on the expectation for everyday comforts of normal individuals because of the decrease in their obtaining influence. In Pakistan Inflation has expanded use of dark cash, unequal dispersion of salary, unemployment and wrong example of generation which made pessimistic effect on equalization of installment because of which individuals of economy who has a place with various divisions endure a great deal by instability in costs.

Hypothesis

- Money supply, exchange Rate and population growth have positive relation with inflation (CPI) in Pakistan.
- Unemployment rate is negatively related with inflation (CPI) in Pakistan.
- There exists demand pull inflation in Pakistan.

Review of Literature

Khan (2006) examined the relative importance of monetary and structuralized supply side factors by considering stylized inflation from 1998-2005 on monthly basis including

money supply, credit to private sector, exchange rate and wheat support prices. The model indicated that monetary factors have played main role in recent inflation with a lag of about one year. While changes in wheat support prices influence inflation only in short run, it can matter in medium term if accommodated by monetary policy but not in long run in Pakistan.

Khan et al. (2009) explained major descriptive causes of inflation trends in Pakistan by using time series data from 1972-2005. Using OLS method, the analysis revealed that government sector borrowing, real demand, private sector borrowing, import prices, exchange rate, government taxes, previous year consumer price index and wheat support prices directly influence CPI of Pakistan. Kemal (2006) also found that increase in money supply over long run is the main source of inflation in Pakistan which verified" quantity theory of money" and suggested that money supply works in short run period of less than a year by using quarterly data from 1975-2004 through Co-integration method.

Gary (995) analyzed dominants factors of inflation in Nigeria by using error correction model and found that concurrent fiscal and monetary policy had a major influence on depreciation of naira, agroclimatic condition and monetary expansion driven by expansionary fiscal policy explain inflationary process in Nigeria.

Bashir et al. (2011) focused demand side and supply side determinants of inflation in Pakistan, he also investigated causal relationship among some macroeconomic variables by considering time series data from 1972-2010. Long run and short run relation have been investigated by Johnson Co-integration and VEM. Their findings revealed that in LR inflation CPI is positively related with MS, GDP, Imports and Government expenditures but Government revenues on other side decreases overall price level in Pakistan.

Batavia et al. (1983) found evidence of a vicious circle between inflation and public sector deficits in period from 1950-75 and examined that inflation increased due to public sector deficit because expenditures increased faster than revenues. Lim et al. (1997) shed some light on determinants of inflation in Turkey by analyzing price determination with-in frame work of multi-sector macroeconomic model during 1970-95 and found that initially MS but recently exchange rate and public sector deficit contribute to inflationary pressure in Turkey.

Aleem et al. (2007) used econometric frame work focusing on determinants of recent inflation in Pakistan and found that adaptive expectations, private sector credit and rising import prices were main determinants of inflation in Pakistan, whereas fiscal policy contribution to inflation was minimal. Imran et al. (2013) attempted to analyze the impact of inflation on agriculture, manufacturing and services sector in Pakistan using time series data from 1972 to 2012 and examined that inflation should be single digit. There is positive relation between inflation, agriculture and services sector while negative relationship between inflation and manufacturing sector. Ayub et al. (2011) reexamined the existence of inflationary growth relationship between economy of Pakistan and GDP

growth rate and found that preventing inflation is harmful to GDP Growth after a certain threshold level so SBP (State Bank Of Pakistan) has to restrict the inflation below 7% and should keep it stable so that it may exert positive effect on economic growth of the economy.

Qayyum (2006) tested the monetarist proposition and presented the result that 90 percent of the variati*on* in inflation was due to easy monetary policy adopted by the State Bank of Pakistan. Bilqees (1998) tested monetarist and structuralism hypothesis to determine the factors affecting inflation in Pakistan. Her study concluded that besides monetary factors, the structuralized factors peculiar to the economy of Pakistan also have to be considered for a better understanding of the inflation phenomenon. Pandit (1993) viewed that Indian government was placing excessive emphasis on demand pull factors and was overlooking the cost push factors, he further added that contractionary fiscal and monetary policy even if effectively implemented are not a good substitutes for efficient resource utilization rather it may hurt the economy and causes stagnation at least in short run. Sahadudhen (2012) studied determinants of inflation in India by considering quarterly data from 1996Q1-2009Q2 using Co-integration and vector error correction model and found that GDP and money supply have positive relation with inflation while exchange rate and interest rate have negative effect in India.

Model Estimation and Result

In this study annual time series data for Pakistan has been used from State Bank of Pakistan Reports, Pakistan Bureau of Statistics and Economic Surveys (various issues) for the period 1982 to 2015. CPI Index is chosen for finding inflation rate in Pakistan because it measures prices of all goods and services consumed by people of Pakistan. While money supply, exchange rate and unemployment are independent variables for measuring CPI inflation.

The first equation for estimation of inflation in Pakistan is,

$$\mathbf{CPI_t = \beta o + \beta_1 MS_t + \beta_2 E.RATEt + \beta_3 U.RATEpt + Ui}$$

Where βo is intercept and β_1, β_2, β_3 are the coefficients of money supply, exchange rate and unemployment rate respectively. Ui is residual term.

CPI = The consumer price index for measuring price level in time t.
MS = Money Supply (for measuring the internal factor) in time t. In Pakistan it is measured by M2 (broad money).

E.RATE = Average exchange rate for measuring the external factor in nominal values in time t.

U. RATE = Unemployment rate for measuring internal factor

The second equation for Pakistan with population growth rate is

$$\mathbf{CPI_t = \beta o + + \beta_1 MSt + \beta_2 E.RATEt + \beta_3 U.RATEt + \beta_4 P.GR_t + Ui}$$

Model Estimation

To test the order of integration of the variables of the model, the Augmented Dickey Fuller test and Phillip- Perron test are employed in this study. The ADF and PP test results are shown in table 1. The result of both tests show that all variables i. e., CPI, MS, EX.RATE, UE.RATE and P.G are stationary at first difference. Thus all series are integrated of order I (1).

Table 1 Data Stationary Test Result

Augmented Dickey Fuller Test Statistics					Phillips- Perron Test Statistics			
Variables	Level		First Difference		Level		First Difference	
	With constant	With Constant & intercept	With constant	With Constant & intercept	With constant	With Constant & intercept	With constant	With Constant & intercept
CPI	-2.79	-3.05	-4.39	-4.03	-2.78	-2.48	-4.37	-4.30
MS	-3.60	-3.53	-6.21	-6.06	-3.61	-3.53	-9.44	-8.39
E.RATE	-0.85	-1.38	-3.27	-3.37	-0.77	-1.28	-3.25	-3.35
U.RATE	1.45	-1.11	-3.64	-3.90	-1.89	-1.02	-3.49	-3.74
P.GR	1.20	-1.14	-2.65	-4.56	-1.12	-1.15	-3.45	-3.66

Table 2 Regression Result (Without Population Growth)

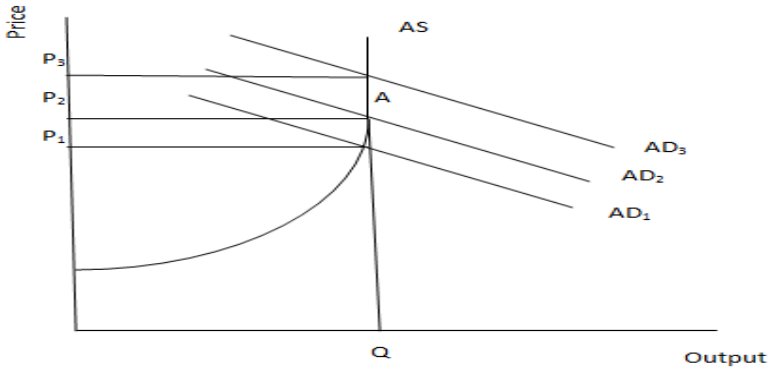
Variable	Coefficient	Std.Error	T-statistics	Prob
C	20.22	7.98	2.53	0.01
MS	0.01	0.00	5.02	0.00
U.RATE	-0.69	0.58	-1.20	0.24
E.RATE	0.29	0.22	2.30	0.01
ADJ-R2	0.98	F-STATISTICS	128.63	
D.W Statistics	1.95	Probability of F-Statistics		0.000

The regression result in table 2 shows that approximately independent variables explain 98% of variation in dependent variable (CPI).The Durbin- Watson statistics of 1.95 shows the absence of autocorrelation. The F-statistics of 128.63 shows that model is significant. The unemployment rate is negatively related with CPI while money supply, exchange rate are positively related with CPI. The t- values of MS and EX.RATE are significant while unemployment rate is negative but not statistically significant, showing that Philips curve does not hold in Pakistan so we accept the null hypothesis for the relationship between exchange rate, unemployment rate and money supply with CPI therefore, rejecting the alternative hypothesis.

Table 3 Regression Result (With Population Growth)

Variable	Coefficient	Std.Error	T-statistics	Prob
C	-47.99	27.22	-1.76	0.08
MS	0.01	0.00	6.02	0.00
U.RATE	-2.82	2.3	-1.18	0.24
E.RATE	0.19	0.37	1.30	0.01
P.GR	8.30	3.51	2.36	0.02
ADJ-R2	**0.92**	F-STATISTICS	194.63	
D.W STATISTICS	1.65	Probability of F-Statistics		0.000

When we include population growth rate in regression we see positive relation between inflation and population growth supporting the view that demand pull inflation exists in Pakistan. Productive capacity or resources in Pakistan have been fully exhausted if it is currently at point "A" in the diagram showing that economy is at the full employment level where AD (Aggregate Demand) and AS (Aggregate Supply) curve intersect since economy has reached full employment level where AS supply curve is vertical after that due to continuous increase in population, AD curve shift further upward due to which there is only increase in price levels but not in output levels or income. Output level is constant and inflation is increasing due to increase in population growth which further stimulates AD. Thus we accept null hypothesis that inflation has positive relation with population growth and is demand pull in Pakistan (also supporting Keynes view).



By using Johnson Co-Integration test, trace statistics values are given in table 3 (including both trend and intercept) which shows long term relationship between the considered determinants and rejects the hypothesis of no Co-integration because one of the absolute values of the trace statistics is greater than relevant critical value (65.21>61.76).

Table 4 Johnson Co-Integration Test Results Including Intercept and Trend

	Trace Statistics	5 Percent	Prob**	Hypothesized
Eigen value		Critical value		No of CE(s)
0.64	65.21	61.76	0.21	None*
0.43	26.16	40.15	0.33	At most 1
0.34	10.01	15.23	0.42	At most 2
0.25	4.07	6.23	0.36	At most 3
o.26	3.02	5.62	0.33	At most 4

*(**) denotes the rejection of the hypothesis at 5% significance level.

Conclusion and Policy Recommendations

We have seen that relationship amongst swelling and the comparing determinants in Pakistan are as per the hypothesis and writing. With a specific end goal to control swelling in Pakistan SBP (State Bank Of Pakistan) needs to decline cash supply since it will impact the economy in two routes, first there will be less cash supply available for use which implies less loaning and acquiring by banks as there is immediate relationship between cash supply and expansion. Second impact is when cash supply diminishes, loan fee is expanded on stores of business banks so individuals will decrease utilization and expansion sparing with a specific end goal to get more return on the grounds that there is negative connection between cash supply and financing cost, in spite of the fact that this will prompted unemployment yet to the extent Pakistan economy is worried there is not a noteworthy connection ship amongst swelling and unemployment in Pakistan. We see positive connection amongst swelling and populace development which affirms the presence of interest force expansion so Pakistan's Government ought to set up new speculation ventures like steel factories or Gwadar ports with a specific end goal to increment profitable limit of the nation.

Presently the time has come to find a way to control swelling by discharging weight on one hand and build the supplies of fundamental wares then again. To facilitate the interest weight t SBP must fixed the money related arrangement and expansions bank rate. So as to give help to regular individuals government likewise can expand the size of utility stores which can supply vital products at not as much as business sector costs.

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