

Empirical Investigation of Macro Economic Factors with GDP “A case of Pakistan”

Muhammad Asif

Department of Management sciences, Comsats Institute of Information Technology, Islamabad, Pakistan.

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ABSTRACT

This paper presents a novel approach to the design and implementation of CPLD (Complex Programmable Logic Devices) based DAS (Data Acquisition System) for various applications. This technique performs the acquisition of physical signal, conversion of analog signal to digital signal and storing of the information. The core heart of the proposed system is CPLD, which allows individual modules on a chip to work independently from each other which is configured and programmed to acquire real time data. The data for the process is acquired using suitable temperature and gas sensors. Signal conditioners are designed for each sensor and are tested in real time. The ADC0808 (analog to digital converter) is adopted for this system, which is a high speed monolithic CMOS device with an 8-bit, 8-channel analog-to-digital converter using successive approximation as the conversion technique. Cool Runner-II CPLD by Xilinx is used as the main controller from which all modules are implemented in VHDL using Xilinx ISE Design Suite 9.2 and simulated using Isim.

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Introduction

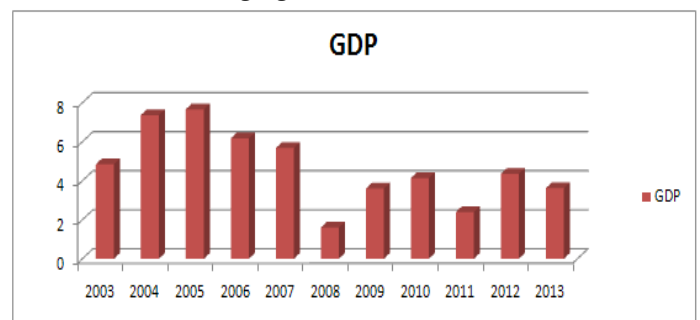
Gross domestic product known as GDP are affected by multi factors. Some factors affect it positively and some hold a negative relation with GDP. Each variable has its own importance and our study will discuss the effect of inflation and interest rate on GDP. Some theorists have found that these variables are inversely proportional to growth of an economy while other researchers have found a direct association among them. In Pakistan these studies are very critical, because economic growth in Pakistan has not been up to the mark for last few years. A continuous increase in the interest rates and inflation has been observed. Godwin (2007) defines real gross domestic product (GDP) increases when economic growth increases. Gyimah-Brempong (1989) found that the military expenses adversely affect the growth of economy. Sub-Saharan African countries using a simultaneous-equations model for the military expenditure effect the economic growth. Khilji and Mahmood (1997) proposed that the GDP growth has negative relation with defense expenses.

Cecchetti (2000) examine the negative relation of economic growth and inflation. Work of Obamuyi (2009) study shows the economic growth and interest rate has significant relationship. Shabbir and Mahmood (1992) found that investment from abroad on the growth rate has noteworthy positive effects, furthermore the three other descriptive variables—namely, domestic savings, loans and exports and disbursements of external grants have a favorable effect on growth but statistically insignificant. Iqbal (1994) is to investigate the effect on real output growth by structural adjustment lending in Pakistan. The availability of adjustment negatively affects the output growth as showed by regression results. Otherwise, Gross domestic product (GDP) positively affected by real domestic savings.

ANTWI et al (2013) study found that macroeconomic factors hold a co-integration relationship with economic growth. Bruno

and Easterly (1998) founded in their research that with critical value of high-inflation of 40 percent or above, the economic growth adversely affected by hyperinflation. The economic growth will decrease when inflation increase with high rate and get better when it reduce. The World Bank (1993) study found that the economy growth positively affected by real interest rate.

The GDP of Pakistan from 2002-13 for 11 year period are shown in the following figure.



It shows that GDP was high in 2004-05 because of economic reforms by the government in that area. In 2005, the report of World Bank for economic reforms in which Pakistan was among top ten countries for best economic reforms. The low rate of inflation is one the major reason from the many explanations behind this steady progress in GDP during this period. The currently inflation rate are comparatively high as compare to previous inflation rates. There was 7.944% to 7.921% inflation rate which is very low compared to the current rate of inflation. But, the GDP rate dropped due to high rate of unemployment in the year 2008-2009. There were still various reasons behind this reduction in the GDP, prime issue was again the sharply risen rising rate of inflation that soared to 13% in 2010. There are also various other factors which also effect the growth like political stability and security issues in that area.

Objective of the study

To explore the relationship between Macro economic factors and GDP

To see how much and which direction each factor influence the growth

Literature Review

The country economic growth can be affected by many factors. E.g Government consumption, Inflation, national Income, Exchange rate and Interest rate etc. In our study we donate the economic growth by gross domestic product (GDP). GDP may have a different relation with many macro-economic factors. In this study we will check the effect of Interest rate and Inflation on GDP. Here are these selected variables explained separately with respect to GDP.

Economists have a two opinion about the inflation relationship with economic growth. In 1950, monetarists and structuralist economists discuss this issue seriously. In monetarists opinion inflation have a negative relation with economic progress. While structuralists said that inflation have a positive relationship with economic growth. Mallik & Choudhry (2001) and Bruno & Easterly (1998) researches shows that economic growth of a country negatively affected by inflation. The results of Dornbush (1993) were verified by Findings of this works that the extreme values of inflation had effects economic growth. There exists very low rate of inflation or very high rate of Inflation extreme values he meant.

Bruno and Easterly (1998) explored only the critical value of 40 per cent and above inflation cases separately. This study concluded that economic growth of any country reduce seriously when it face high inflation and when there is decrease in inflation then gets better immediately. Inflation creates snags and difficulties in the whole sector of the economy of a country not only the matter of individuals. De Gregorio (1993) and Barro (1995) studies also shows the negative relation between inflation and economic growth.

Similarly, Smyth (1992, 1994, 1995) concluded that growth rate reduce by 0.223% when increase of one percent in inflation. This relationship is insignificant but negative at low rates of inflation, while economic growth negative effected by significant higher rate of inflation. Blejer (2000) and Qayyum (2006) also have similar findings that the economic growth of country suffers and government faces problems in running policies efficiently with the high inflation in economy.

Other than the economic growth reduction, inflation also endorses insecurity in economy of the country. Due to this uncertain nature of inflation, central bank of every country have expanded the idea of main constancy and declared it as a major function of monetary policy of the country. Blejer (2000) and Qayyum (2006) also concluded that monetary policies of the country are major reason of high inflation. They also recommended that Stated Bank of Pakistan (SBP) should adopted fitted monetary policy for low inflation rate. Pakistan has the loose monetary policy or in other words excess supply of money growth.

As Goldstein (2002) commented that a step to over fast-track the economy, through increase in money circulation or by the currency depreciation will does not boost the economy but give rise to high inflation Fry, (1995) and Galbis (1995) conduct the study on the relationship of economic growth and real interest rate. The investigation shows that there is positive and significant relationship between the economic growth and the real interest rate. World Bank (1993) conducted the study on economic growth and real rate of interest which results shows that real interest rate has a positive and significant relation on

economic growth without inflation but when the inflation added it does not show significant relationship of coefficient on the rate of interest. De Gregorio and Guidotti (1995) examine that when the real interest rate are very low value its causes to reduces economic growth due financial disturbance in the economy.

Giovanni and Shambaugh (2007) examine the connection between annual real output growth in other countries and interest rates in major industrial countries. The results show that in the domestic economy, the high foreign interest rates have a contractionary effect on annual real GDP growth, but that this effect is focused on countries with fixed exchange rates. How the major-country interest rates affect other economies through potential channels this study also examines. The domestic interest rate affected by foreign interest rates is the most likely channel when associated with other likelihoods, such as a trade effect.

Obamuyi and Olorunfemi (2011) explore the effects of interest rate behavior and financial reform on the economic growth in Nigeria. Study results revealed that interest rates and financial reform have significant influence on economic growth in Nigeria; also, results indirect that the interest rate behavior are important for economic growth.

Data

For this research we use the secondary data to check to effects of macro-economic factors on economy growth. We take the data of GDP, inflation and interest rate of Pakistan from World Bank and IMF official documents. The data from 2003 to 2013 for 11 years period will be taken for this analysis and annual data will be use.

Methodology

In our analysis through regression the results will be taken. In our study we will examine the effect of two major macro-economic variables on country economic growth. We will use the Inflation and Interest rate as independent variable and economic growth (GDP) as dependent variable. The proposed model for the study will be;

$$GDP = \beta_1 + \beta_2 \text{Inflation} + \beta_3 \text{Interest rate} + \mu$$

This is time series analysis and as above mention that 11 years annual data will be used from 2003 to 2013. Our purpose is to see the effects of these variables on GDP. Whether these variables can significantly affect the GDP or not. With the reference of the literature the interest rate has a positive effect on economic growth (GDP). But the inflation and GDP relation are not clear, some author says that it has positive effect on growth and some says that it hold a negative relation with economic growth(GDP). These results are vary from country to country. The expected sign for interest rate is positive and negative for inflation.

Hypothesis

H1: There is a Negative effect of Inflation on GDP growth

H2: There is a significant effect of interest on GDP growth

Results

In order to see to effects of inflation interest rate with economic growth of Pakistan we use the regression analysis. The multivariate tool used to examine the consequences of different shocks in GDP of Pakistan. The table 1 shows the correlation of these variables with each other. Interest rate has a negative relation with gdp -0.3520 and the inflation hold also a negative relation with gdp -0.6685. as in Literature we see the negative relation of these variables on gdp.

Table 1

	years	gdp	interest rate	inflation
years	1.0000			
gdp	-0.6308	1.0000		
interest rate	0.6356	-0.3520	1.0000	
inflation	0.4406	-0.6685	-0.1597	1.0000

Table 2 the regression results examined by goodness of fit of model by coefficient of determination (R Square), individual significance and overall reliability of the model. In our analysis R2 value is 0.6629 and adjusted R2 value is 0.5786. so the value are satisfactory and acceptable.

In table 2 we use the 5% level of significance. For inflation, p-value remained 0.007(0.7%) that reject the null hypothesis (H0) and also examines the significant relationship with growth rate. interest rate p-value remained 0.053(5.3%) that show interest rate have insignificant relationship with GDP growth, so do not reject (H0). At the end, it could be concluded from table 2 regression analysis that all variables that included in model have significant relationship with annual growth rate on GDP.

In coefficient values inflation have a negative relation with economic growth. The 1% increase in inflation will lead to 30.22% decrease in economic growth by keeping other factors constant. The 1% increase in interest rate may lead to 26.04% decrease in GDP growth of Pakistan when others factors hold constant.

The value adjusted R2 is 0.6629 so it means 66% explained variable is sensitive to explanatory variables like that interest rate and inflation rate. This value of R2 is also shows that growth rate of GDP also be influenced by some other factors such that political instability, balance of payments, foreign direct investment and government spending and government policies. To explore the overall reliability of model, F-value was examined. So p-value for f test is 0.0129 (1.2%) that also tells model is highly significance.

Table 2

Source	SS	df	MS	
Model	24.4057097	2	12.2028549	
Residual	12.4133096	8	1.5516637	
Total	36.8190193	10	3.68190193	

Number of obs = 11
F(2, 8) = 7.86
Prob > F = 0.0129
R-squared = 0.6629
Adj R-squared = 0.5786
Root MSE = 1.2457

gdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
inflation	-.3022247	.0845094	-3.58	0.007	-.4971038 - .1073456
interest rate	-.260474	.1150724	-2.26	0.053	-.5258315 - .0048836
_cons	7.904781	.9648034	8.19	0.000	5.67994 10.12962

In our study, we try to explore the empirical relation of inflation and interest rate with GDP of Pakistan. Our study confirms the studies of Barro(1995) and Dornbush (1993), where they reconnoiters inflation have significant relationship with GDP. Our research also endorses the results of Malik and Chaudhry (2001), they extreme values of inflation rate in both cases either high or low badly effect the growth of the economy of the country. So, both situation can badly effect the growth rate. State bank of Pakistan should implement contraction of monetary policy. This study is not compatible with the study of Smyth (1994-95) that found insignificant association between rate of inflation and GDP growth. For inflation there are different opinions of authors some says it has positive relation and some says it has negative relation with growth.

Results of our study examine the interest rate have insignificant relationship with growth of GDP, that confirms the findings of Galbis and Fry (1995) in the case of insignificance. But the difference in our results in terms of relationships. Those researches show positive relationship between interest rate and growth but in our case it shows negative relationships. Our research also confirms the results of Rodrick (2008) who found depreciation of currency raise the economic growth of underdeveloped countries.

Conclusion and recommendation

The results of this research are similar to the mentioned literature that inflation significantly affects the economic growth of a country, explaining that low level of inflation also bring about boost in savings and more interest on deposits that causes the increase in lending, and the people who lend encouraged and raise their investment which has positive impact on the growth of the economy. In this analysis of study shows that inflation rate is negatively related to GDP growth in long run. But it is contradictory the previous literature where there is positive relation between inflation rate and growth rate of the country. It is also found that impact of inflation to growth is more than the sensitivity of growth to inflation. A contraction of monetary policy can be a tool to reduce inflation. In addition to this, it is also suggested that the State Bank must have to decrease money printing that is a key step to reduce inflation.

Interest-rate must be enough to increase deposits that directly fulfill the investment's needs and for this purpose people are encouraged to deposit their money in the banks rather than spending anywhere else, so saving will contribute positive in growth. This study will helpful for policy makers and investors for their future decisions. In the light of these finding policies can be developed to boost the economic growth. Investors can use these finding for their decision making where to invest and where to not. They can make their investment decisions more appropriate.

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