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# International Incidences, Macroeconomic Variables and their Volatility Effect on Economic Growth: Empirical Evidence from Pakistan

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**Abstract**

This study incorporates the volatility connection among them. In order to capture the volatility connection and influence of variables on GDP we employed ARCH/GARCH model. Results suggested that IMF and FDI and GDP are negative related whereas capital formation, exports, market capitalization global financial crisis, 9/11, and Iraq war having significantly positive relation to GDP. GARCH reported that there is persistence of volatility past to future exists in Gold significantly but insignificant in other variables. Moreover, exchange rate and inflation having positive but insignificant volatility, but FDI, Gold prices significant variance. Iraq war is having negative but significant volatility and global crisis is having negative volatility.

**Keywords:** Volatility, Garch, Economic Growth, Macroeconomic, Financial Crisis

## Introduction

Economic growth of country is dependent on various factors such as international and national (macroeconomic) dynamics. The international factors which effect the economic growth of any country could be war fares, global crises, and regional disability (Chen and Siems 2004). Consequently, these factors not only create unstable or low growth of economy and also affect other factors which are indirectly linked to economic growth. The factors which are further linked to international factors are precious metals (gold) prices, oil prices, foreign aids and loans, foreign direct investment, exchange rates and etc. Secondly, national factors which are macroeconomic such as capital formation cash surplus/deficit, inflation,

exports, and the situation of law and order in country. When all these international and macroeconomic elements combine they drastically effect the economic growth of country. Developing countries like Pakistan get adversely affected by the volatility in prices and external and internal conditions of country and region.

Economic theories suggested that the oil prices have vital role in overall economy performance and connected to business cycles. Oil prices behavior has always gained importance because of change in oil prices brings change in pricesproduction and commodity. Gold has served as a hedging tool against the inflation and currency depreciation (Cai, Cheung and Wong 2001). Ghosh et al. (2002) examine the movement between gold, inflation and nominal price and concluded that gold is a long-run hedge against inflation and nominal price movement is dominated by the short-run influences. Inflation and exchange rate also effects economic growth adversely (Mahmood et al, 2011). Capital formation is resource generation of country which also put contribution in the economic development of economy. As much resources available in country will enable an increase the rate of capital formation in economy (Romer 1986, Romer 1990). High level of exports enables toearn foreign exchange for country also improves the relationship among countries (Makki and Somwaru 2004). But when there is disability arises in region it adversely affects the trade among countries and put negative impact on development of country (Glaser and Weber 2006).

Asian region facing disabilities such as Iraq war, American intervention due to 9/11, and terrorist activates have adversely affected regional as well as Pakistan's economic growth (Glaser and Weber 2006). All the activities which were witnessed during past 10 to 15 years showed an immediate change in the economy of Pakistan. These war activates where increased the funding from IMF to Pakistan also resulted an increase in debt servicing which consequently caused loss of foreign exchange. The foreign exchange which can enable country to import technology for enhancement of capital formation and economic development wasted on servicing of debt. Regional disability caused triggered effect of terrorism in side Pakistan due to ally to Amerce. Wave of terrorism caused disability in Pakistan and as a result FDI effected which caused KSE decline and affect GDP growth. Diaz-Alejandro (1977) inspected that the foreign capital can decrease the economic growth by earning extra profits in a country with severe trade misrepresentations like high tariffs.

Macroeconomic factors and financial crisis are always being associated so these crisis effects the economic growth. For instance, the era of Asian crisis resulted in the negative growth of income where the East Asian countries were growing rapidly before crisis (AsianDevelopment Bank, 1999). Similarly, in the global crisis where the finical institutions of US and UK crashed as a result it seriously affected European as well as Asian region economy. Several growth theorists say that financial crisis on economic growth derives the factors of growth and growth is supported by capital accumulation, which diminishes in the long run (Solow, 1956).

This paper aims to study the effect of macroeconomic and international or socio economic and political factors effects on the economic growth of Pakistan. To study the volatility in the economic growth GDP is used as indicator of growth. How change in international scenario and regional disability effected the economic growth. International changes like terrorist attack on Amerce and its consequence on specifically Pakistan. Termination of Sadam Hussain regime, American intervention in Iraq, increase in oil and gold prices and as a whole effects on Pakistan. Moreover the IMF aids and its effect also incorporated in the study. Connection between all these events and macroeconomic factors are examined and how volatile economic growth of Pakistan is.

**Literature**

Glaser and Weber (2006) examined the terrorist attack how they influenced expected returns and volatility forecasts of single investors. Chen and Siems (2004) inspected the association of significant abnormal returns in capital market with terrorist and military attacks including the 9, 11 attack. Ewing and Malik (2013) assessed daily oil and gold returns from July 1993 to June 2010. Uni-vriate and bi-variateGARCH model was used to examine the volatility of both variables. They determined the significant volatility transmission of returns wasrealized by applying structural break in variance and optimal portfolio returns.

Bapna et al. (2012) findings were GDP and other variables have less impact on gold where inflation and exchange rates were having high effect on gold prices at individual level. Bi-direction relation of growth rate and GDP was found on gold. These results were concluded by applying regression, unit root test and granger causality test technics to check cause and effect relationship of gold and macroeconomic variable.

Mahmood et al. (2011) evaluated the volatility among macroeconomic variables by using GARCH model. The time frame used was from1975 to 2005. Outcomes showed exchange rate is influenced by the volatility of macroeconomic variables in Pakistan.

Mani and Vuyyuri (2003) importance of gold and demand were examined. Multi regression model results showed that alternative metals effect gold price gold can be uses to cover up loss as a hedging instrument.

Ha Jun (2009) assessed the relationship among variable and determined that there is negative relationship among gold demand, inflation and market index.Where there is an evidence of positive relationship between inflation and exchange rate.

Yahazadehfar and Babaie(2012) used vector auto regression model Johansen-Juselius Co-integration to investigated the relationship of macroeconomic variables on capital market of Iran. Stock market and macro variables were found positively related. Engle et al. (2009) concluded macro variables perfume significant role in short and long run and volatility in industrial growth and inflation was approximately 10 to 35 percent per day. The relationship was measured by using component model.

Ghosh et al. (2002) used co-integration regression model to examine the movementbetween gold, inflation and nominal price. The time span was used from1976 to 1999. They concluded that gold is a long-run hedge against inflation and nominal price movement is dominated by the short-run influences.

Eraker et al. (2003) continuous-time stochastic volatility models was used to evaluate the jumps in returns and volatility. Results showed strong relationship exists between the returns jumps and volatility. Andersen et al. (2000) investigated returns and volatility distribution of returns, correlation and covariance. Found that the stocks with high volatility have less average returns and asymmetric relationship also exists between returns and volatility. Mishra et al. (2010) studied financial and macroeconomic from 1991 to 2009. Analysis showed causality relationship among variables and found granger caused by both variables to each other. Ederington et al. (2004) five daily equity returns were examined from Dow jones index, treasury bills foreign exchange rate Yen and Euro and S& P 500 index and resultrepresented the deviation of adjusted absolute mean return beats GARCH regularity. Furthermore findings alsoverified the normal distribution of log return and absolute return abnormality. Le, etal. (2011) evaluated the connection between the oil and gold by using data from 1986 to 2011. They examined index of US dollar and inflation. The asymmetric non liner effect of oil on gold price was witnessed. Long run relationship exists between them.

Capie Mills and Wood (2005) weekly data of about 30 years was used to concluded the variation of foreign exchange dollar value can be intensely hedged by gold. Šimáková (2011) assessed the co-movement between price levels and factors of price trends between gold and oil prices and also their relationship. Grangar causality, Vector error correction and Johansen co-integration test results concluded evidence of long-term relationship between variables.Datta and Mukhopadhyay (2011) Vector error correction, Vector impulse response function and variance decomposition were used to evaluated inflation and economic growth variables. Findings showed long run relationship between inflation and economic growth, an evidence of short- run causality also exists between variables. Furthermore economic growth granger causes the inflation.

Wang et al. (2010) investigated the relationship among oil, gold, exchange rate on stock price of Germany, Japan, US, China and Taiwan. Co-integration fluctuation exists between variables and long term even relationship also exists among variables against variouscurrencies. Results also showed no co-integration between US stock indices and there is no long term and stable relationship. Moreover there aretwo way causal relationships between Taiwan, oil, gold and stock prices. Li (2006) demonstrated non-liner relationship between growth and inflation. Results interpreted a non-liner relationship between inflation and growth. This demonstration was conducted in both developed and developing countries which revealed significantly different forms of non-linearity in the inflation and growth connection.

Ayyoub, et al. (2011) relationship of inflation and economic growth showed significantly negative relationship prevalence. OLS was used to evaluate the time series data for the period 1973-73 and 2009-10. Mangani (2009) used GARCH model to evaluated macroeconomic variable effect on the JSE stock. Results indicates the substitution effect on the non-resourceful and resourceful stock due to change in gold price. Dynamics of returns are expressed by discount rate and stock returns volatility was highly influanced by gold prices. Shazadi and Chohan (2011) concluded that the investors attitude is changed by the increase in gold prices. İnvestors preffer in gold investement due to loss in stock exchange.

Yahyazadehfar and Babaie (2012) VAR model and Johansen Juselius Co-integration test used to evaluate the negative relationship among interest rate, stock price and gold price, whereas house and stock prices are positively related and stock prices quickly respond to shocks. Obamuyi (2009) concluded interest and growth rate are having log run, unique andsignificant relationship existence. He used error correction and co-integration model for analysis.

Cai, Cheung and Wong (2001) time varying volatility was discovered gold prices and gold futures. Furthermore announcement of US about inflation and GDP have a strong impact on gold returns un-predictability. Narayan, et al, (2010) reviewed the oil and gold futures long-run relationship existing between various maturities. Existence of co-integration was found results also shows inflation can be hedged by the gold and investor can use oil price to predict gold price. Hooker (2002) inspected relationship between inflation and oil. Results showed evidence of relationship existence between inflation and oil prices. Sari et al, (2010) investigated gold, oil and inflation relationship. Results indicate unpredictability of gold price due to its demand or its use as investment currency reserve tool, instrument, jewelry and hedging against the inflation. Ogwumike and Omole (1996), Ojo (1998), Abdullahi (2005); Adam and Sanni (2005) suggested that for Nigerian economic development capital market is important. Agarwal (2001) argued real rise of economic growth is attained by the development of capital market and by facilitating them. Liu and Hsu (2006) examined development in Taiwan, Korea and Japan and reported that stock market is having positive impact on economic growth.

Blomström, Lipsey, and Zejan (1994) found inflow of FDI is positively toward GDP in among developing countries, from 1960 to 1985. Moreover the impact of on growth is positive and higher in those countries which are having high per capital income.Borensztein, De Gregorio, and Lee (1995) argued that growth of 69 developing countries is marginally effected by the inflow of FDI.Balasubramanyam, et al. (1996) examined sample of 46 LCD's from 1970 to 1985 conducted cross sectional study. Results suggested countries which adopt trade liberalization policies they gain benefit of growth from FDI. Zhang (2001) also reported parallel result. Devarajan, et al. (1996) suggested that per capita growth is negatively affected by public fixed capital formation. Doucouliagos and Paladam (2009) found that the Asian countries are highly affected by aid-growth. Papanek (1973), found that significant and positive relationship exist between economic growth and foreign aid. He detached aid from various type of foreign capital and only examined savings, foreign private investment.
Hsiao and Hsiao (2006) investigated that exports increase FDIby concreting the path for FDI by collecting information of the host country that helps to reduce transduction cost of investors. Moreover FDI could reduce exports by helping foreign markets through formation of production facilities there. Diaz-Alejandro (1977) inspected that the foreign capital can decrease the economic growth by earning extra profits in a country with severe trade misrepresentations like high tariffs.Ben-Porath (1967), concluded life time labor input is associated with the rise in life expectancy and both contributes ingetting rise in investment in human capital and consequently prompt economic growth. Makki and Somwaru (2004) examined that export progress surges factors of productivity due to increasesattained from increasing returns to scale.Furthermore the export growth decreases the foreign exchange limitationswhich ultimately results in an increase in the import of capital or technology concentrated intermediate inputs. Romer (1986, 1990), engine of economic growth urges the importance of science and technology. The capital spillover was created by firms, which as a result create knowledge. This knowledge has produced positive externalities, which resulted in prevention of growth to diminish in the long run.

**Methodology**

This study is organized to find out an influence of different socio economic factors on the volatility of GDP in Pakistan by using different methods of volatility estimation such as (ARCH) and (GARC). Different researchers examined relationship of these macroeconomic variables on the volatility of stock market returns Schwert (1989), Karolyi (1995), Liljeblom&Stenius (1997), Kearney & Daly (1998), Muradoglu et al. (1999), Morelli (2002), Rousan and Al-Khouri (2005), and Chowdhury et al., (2006) studied the potential influence on stock market volatility through GARCH and vector Autoregressive models. The most commonly used method for modeling the behavior of financial time series and association between stock market volatility, macroeconomic variables, bonds, currencies derivatives and price volatility is ARCH model originally developed by (1982, 1983) and Cragg and Malkiel (1982). The Arch model has an ability to capture volatility and non-linearity in time series in addition to the conditional and non-conditionality of time series, which allows the variance of series to depend on available information set. One very important evil of time series is the variance in error terms i.e. existence of heteroskedasticity. However, heteroskedasticity has also been observed in time series, and can be considered a reflection of the way of systematic variability of the dependent variables during the time. Therefore, Heteroskedasticity can be viewed as a time varying variance (i.e. volatility). The variance in the error term at a specific time is considered as uncertainty at that specific point in time.

The Autoregressive Conditional Heteroscedastic (ARCH) is sum of two different processes i.e. AR(p) process; the return series is regressed on its previous value. Moreover, the conditional variance is regressed on constant and lagged values of the squared error term acquired from the mean equation. The ARCH model is further extend by Engle and Bollerslev (1986) commonly known as (GARCH), which includes the lagged values of the conditional variance. The (GARCH) model is therefore capable of taking the leptokurtosis, skewness, and volatility clustering in data time series. GARCH model also takes into account the historical variances which explain the future variances. Therefore, when there is a Heteroskedasticity in the data, it means that the expected value of the error term is not constant. Models of stochastic volatility and ARCH/GARCH are of significance importance in forecasting volatility, because they explain the importance of the degree persistence of shocks in the volatility in returns and different macroeconomic variables. The entire focus in the use of ARCH/GARCH is on the error process. These models incorporate the number of lags which may influence the returns and conditional variances.

In this study we used GDP growth as a measure of economic growth, and different socio economic variables as potential influencers. These macroeconomic variables are incorporated in the mean and variance equations to find out the predictive power of the macroeconomic variables on economic growth. Additionally we used dummy (D) variables to capture the impact of 11 September, Iraq War, Afghan War and Global financial crises on economic growth. The values of (D) are 1 for existence and 0 otherwise.

The hypothetical model is as under:-

$$GDP = f [CF, CS, EX,FDI,IMF,MC,R,ER,GP,OP,D1,D2,D3,D4]$$

In order to measure the volatility of macroeconomic variables on the economic growth the following model is measured:

$$GDP = \alpha + \beta 1cf + \beta 2cs + \beta 3ex + \beta 4FDI + \beta 5imf + \beta 6MC + \beta 7R + \beta 8ER + \beta 9GP + \beta 10OP + D + \epsilon$$

Here in the above model $\alpha$ is constant and $\beta$ is coefficient of the variables, whereas $\epsilon$ is an error term. It is hypothesized with the support of literature that $\beta 1$, $\beta 2$, $\beta 3$ $\beta 4$ $\beta 6$ $\beta 9$ $\beta 10$ are anticipated to have positive value, whereas $\beta 5$ $\beta 7$ and $\beta 8$ have negative values. In order to find out the rate of change in the variables, growth of the variables is calculated.

In this study we took real gross domestic product (GDP) as a proxy of economic growth in Pakistan. It is assumed that the economic growth is affected by number of variables like Capital formation (CF), Cash Surplus (CS), Exports (EX), Foreign Direct Investment (FDI), International monetary Fund (IMF), Market Capitalization (MC), Inflation (R), Exchange Rate (ER), Gold Prices (GP), Oil Prices (OP). We also used different dummies to capture the potential influence of different social variables on the economic performance of Pakistan. The dummies are used for 11 September, Iraq War, Afghan War and Global financial crises on economic growth.

Rate of change i.e. growth is calculated for each variable by using the following formula

Ln (Current value /Previous value)*100

We used real GDP for our analysis to capture real economic growth and simultaneously will reduce the level of multicollinearity. The monthly time series are generated by using E-views Software.
Exchange rate used is the nominal exchange rate (PKR VS US dollars); the nominal exchange rate is the domestic currency per unit of US Dollars.

**Descriptive Statistics of the Variables**
In order to check the stationary level of the time series, unit root test is applied, because non-stationary series produces normal properties problem. If the regression is used on these series it will create questionable, invalid and spurious results. Therefore stationarity of time series is ensured by apply (Dickey and Fuller, 1979; 1981) and Phillips-Perron (PP) (Phillips and Perron, 1988). The results are reported in Table – 2. Overall results of the two tests are consistent, that the variables are stationary on level I(0). All the variables are stationary and allow continuing an analysis (Gujarati 2003). Therefore the volatility of GDP is estimated by using ARCH/GARCH model. All the analysis is performed by using E-Views and Excel.
Empirical Results
The empirical results indicate mixtures of results in modeling the volatility of GDP on the basis of different socio-economic variables. There may be certain variables common for all the economies but the results cannot be generalized without investigating the facts about that economy. Each economy has its own pattern and way of operations; they face unique set of risks and potential benefits, rules and regulations, geographical position, environmental factors, investors' attitude and economic and political policies.
In the first stage of analysis GDP is regressed on its lagged value i.e. GDP of previous year to check whether the series is characterized by ARCH effect i.e. AR(1) process. The current value of GDP significantly positively depends on its previous value.
The results are reported below in Table 1:

$$GDP = \alpha + \beta 1 GDP(-1)$$

These results are not the point of interest for researcher, therefore the existence of ARCH effect in the residuals of the model is estimated by apply ARCH test. The below presented results suggests the rejection of Null hypothesis of homoskedasticity or the ARCH (1) effect exists.
The results are reported below in Table 2:
The probability of F-Static rejects the null hypothesis and ensured the existence of heteroskedisticity. Observes also the lagged squared residuals are all highly statistically significant. Therefore it gives a strong argument that an ARCH model will provide better results. Therefore the following ARCH (1) model is estimated.
The results are reported below in Table 3:

The upper part of the model is devoted to mean equation specification, whereas the lower part variance equation specification is ARCH specification.
The impact of different socio-economic variables is estimated by using ARCH model. The lagged squared error term is positive and significant at 1% level which fulfills the specified requirements of the model. The results on the basis of ARCH (1) model are presented in above table. The results indicate that FDI has in inverse impact on GDP. The negative value of (-0.003945) is highly statistically significant. Zhang (2001) found mixed results about the role of FDI in an economic performance i.e. GDP. He found that for FDI does not have positive

impact for Columbia, Argentina, Brazil, Korea, Malaysia, Thailand and Singapore. The lack of management and poor link between local firms may cause poor or negative impact of FDI on GDP.

Other macroeconomic variables have missed results as:

Capital formation (CF), the findings showed positive relationship between GDP and capital formation, the coefficient has a positive value of 0.180168 which is highly statistically significant. Increase in capital formation will increase the production capacity and ultimately will improve GDP. The contribution of the private sector to domestic capital formation is two-fold higher than the public sector.

The coefficient of cash surplus has a positive value of 0.084115 which is also highly statistically significant.

Exports include the money value of all the goods and services provided to the rest of the world. Goods include the merchandises, whereas service includes, insurance, freight, travelling, transportation, fees, royalties, license, construction, government and financial services. The results confirm a positive relationship between GDP and exports of Pakistan, the coefficient has a positive value of 0.232447; the value is highly statistically significant. The results are consistent with Dollar (1992 that the export oriented counties grow faster than import oriented countries.

The results indicated significantly positive association between inflation and GDP. The coefficient value is 0.021086 which is highly statistically significant. Real GDP in the long run do not have any relationship with Inflation. However in the short run it does have direct relationship with GDP. In the short run when there is a high inflation or high expected inflation firms believe that their products are commending high prices, therefore they produce more even by employing more human capital.

Moreover the study indicates that the exchange rate has indirect impact on GDP, the value is positive -0.000126 but statistically insignificant. The relationship of slow economic growth and overvaluation of currency has not been theorized explicitly in the literature, but it is linked with macroeconomic instability. Overvalued currencies are allied with foreign currency shortages, corruption and rent seeking, these factors causes current account deficits, crises in balance of payment, causes macroeconomic cycles. All these factors cause to damaging economic growth.

Foreign loans are used to facilitate the capital formation in an economy which is expected to improve productivity and real GDP. The coefficient also indicates negative association between use of IMF and economic growth. The lenders significantly impede the economic policies in addition to momentous amount of repayment of loan. These repayments put huge pressure on the economy and may cause negative impact on economic growth. The value of coefficient is -0.008846 which is highly statistically significant.

Market capitalization has a positive value of 0.005231 which is highly statistically significant. High market capitalization shows the confidence of investors in the organizational equities. Increased investors' confidence causes to improve organizational productivity. Therefore market capitalization has direct association with GDP as evident with a value of 0.009022; the value is highly statistically significant.

Dummy variables are being used to capture the impact of different world events on the economic growth of Pakistan. All the three dummies used to measure the impact of 9/11; Global financial crises and Iraq war are positively statistically significant.

Volatility in Returns

Sensitivity of volatility in GDP growth is significantly important for economic decision making. Volatility at a certain period may be dependent on the squared error terms from the past periods. ARCH model is used to find out volatility in GDP because of squared error term when it is expected that the conditional variance is not constant.

The first segment of this section will examine the volatility in GDP because of squared error term. In order to do this we employed ARCH (1) model. The analysis is performed in two different parts. In the first part only macro-economic variables are being used, whereas in the second part only dummy variables are being used.

The results are reported below in Table 4:

The results of variance analysis reveals that squared error term of two variables affect the variance of current period GDP. In the macro economic variables two variables i.e. exchange rate and inflation has positive volatility, which is not statistically significant. The rest of variables affect the volatility negatively which is also not statistically significant. However two variables i.e. FDI and Gold prices have significant values.

The results indicates that when the error term of FDI and Gold Prices are not constant and exhibits spread it will have significantly negatively effect on the variation in GDP.

The three dummy variables used in the model are also incorporated in the variance equation to find their role towards volatility.

The results are reported below in Table 5:

The result of dummies indicates that variance of GDP during the time of global financial crises and Iraq war is significantly differently. The period of global financial crises has positive impact on GDP volatility, whereas the impact of Iraq war is totally opposite i.e. negative and statistically significant.

The variance / volatility may also depend on past history, because variance will change over time. The variance may depend on the lagged period of squared error term. The persistency of variance is measured by applying GARCH model. The results are presented in the below table:

The results are reported below in Table 6:

The results indicate that the lagged period variance of error term generated from gold prices only significantly affect the future period variance, rest of the variables are not statistically significant. The analysis is also performed on dummy variables, the results are presented below:

The results are reported below in Table 7:

Results indicate significantly different behavior for global financial crises and Iraq war. The volatility in GDP is positively affected by variance in the error term of the lagged period global financial crises and the impact is negative for Iraq War.

**Conclusion**

This study investigates the influence of various variables on growth of economy of Pakistan. To investigate the volatility in economic growth (GDP) due to various factors such as socio-economic and macroeconomic. To capture the effect of these factors different variables were used in our study. These variables are exchange rate, inflation, oil price, gold price, capital formation, market capitalization, cash surplus/deficit, Exports, FDI (foreign direct investment), GDP (gross domestic product),and IMF. To incorporate the impacts of socio-economic dummy variables are used such as global financial crisis, Iraq war, and 9 September. The results of ARCH (1) model indicates that FDI has an inverse impact on GDP; these results are aligned with the study prior conducted by (Borensztein, De Gregorio, and Lee (1995),

Zhang 2001). This exposes that there is presence of lack of management and poor association among local firms which may cause negative impact of FDI on GDP. Furthermore the results for other indicators of macroeconomics showed positive relationship between capital formation and GDP with highly statistically significant outcomes. This depicts that increase in capital formation will improve economic growth (GDP).Whereas contribution of the private sector to domestic capital formation is two-fold higher than the public sector. Cash surplus also showed the positive and highly significant statistics. Expansion of exports will increase the growth rate of GDP results confirmed that improvement in exports will results in GDP growth (Dollar 1992). GDP and Inflation are having significantly positive association. In long-run GDP and inflation have no relationship but in short-run having direct relationship. In the short-run when there is a high inflation or high expected inflation firms believe that their products are commending high prices; therefore they produce more even by employing more human capital.

Additionally study indicates that the exchange rate has indirect impact on GDP, while the value is statistically insignificant but positive. Foreign loans such as IMF funds and GDP are having negative relationship between each other which depicts that funds are not playing role in economic growth. However it is considered that foreign loans or aids are used to facilitate the capital formation in an economy which is expected to improve productivity and real GDP. The lenders significantly obstruct the economic policies in addition to huge amount of repayment of loan. These repayments put high pressure on the economy and might cause negative influence on economic growth. Moreover market capitalization is positively and significantly related to GDP. The world events such as 9/11; Global financial crises and Iraq war are positively statistically significant. Sensitivity of volatility in GDP growth is significantly important for economic decision making.

Volatility at a certain period may be dependent on the squared error terms from the past periods. GARCH model results show that two macroeconomic variables i.e. exchange rate and inflation has positive volatility, which is not statistically significant. The other variables affect the volatility negatively which is also not statistically significant. But two variables i.e. FDI and Gold prices have significant values. Further findings also indicates that when the error term of FDI and Gold Prices are not constant and exhibits spread it will have significantly negatively effect on the variation in GDP. Findings of dummy variables showed their role towards volatility. The result of dummies indicates that variance of GDP during the time of global financial crises and Iraq war is significantly differently. The period of global financial crises has positive impact on GDP volatility, whereas the impact of Iraq war is totally opposite i.e. negative and statistically significant. Finally persistence variance or volatility in variables checked through GARCH which showed that gold prices only significantly affect the future period variance, rest of the variables are not statistically significant. Furthermore results indicate significantly different behavior for global financial crises and Iraq war. The volatility in GDP is positively affected by variance in the error term of the lagged period global financial crises and the impact is negative for Iraq War.

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Table: 1

*Dependent Variable: GDP*

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.000623 | 0.000266 | 2.340976 | 0.0203 |
| GDP(-1) | 0.920211 | 0.028502 | 32.28543 | 0.0000 |

Table: 2

Table: 3

ARCH Test

| | | | |
|---|---|---|---|
| F-statistic | 129.6288 | Prob. F(1,177) | 0.0000 |
| Obs*R-squared | 75.67311 | Prob. Chi-Square(1) | 0.0000 |

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 1.92E-06 | 4.83E-07 | 3.974103 | 0.0001 |
| RESID^2(-1) | 0.651102 | 0.057187 | 11.38546 | 0.0000 |
| F-statistic | 129.6288 | Durbin-Watson stat | | 2.119718 |
| Prob(F-statistic) | 0.000000 | | | |

Dependent Variable: GDP
Method: ML - ARCH (Marquardt) - Normal distribution
GARCH = C(15) + C(16)*RESID(-1)^2

| Variable | Coefficient | Std. Error | z-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.001565 | 6.71E-05 | 23.33859 | 0.0000 |
| CF | 0.180168 | 0.007846 | 22.96159 | 0.0000 |
| CS | 0.084115 | 0.002096 | 40.13844 | 0.0000 |
| ER | -0.000126 | 0.001015 | -0.124026 | 0.9013 |
| EX | 0.232447 | 0.004653 | 49.95731 | 0.0000 |
| FDI | -0.003945 | 0.000636 | -6.201735 | 0.0000 |
| GFC | 0.001311 | 8.40E-05 | 15.61252 | 0.0000 |
| GP | -0.000177 | 0.000323 | -0.547963 | 0.5837 |
| IMF | -0.008846 | 0.001050 | -8.425655 | 0.0000 |
| IW | 0.002550 | 7.36E-05 | 34.63622 | 0.0000 |
| MC | 0.005231 | 0.000685 | 7.641299 | 0.0000 |
| OP | 0.001009 | 0.000103 | 9.817975 | 0.0000 |
| R | 0.021086 | 0.001120 | 18.83374 | 0.0000 |
| SEP | 0.000218 | 5.19E-05 | 4.197236 | 0.0000 |

| | Variance Equation | | | |
|---|---|---|---|---|
| C | 3.54E-09 | 2.48E-09 | 1.429483 | 0.1529 |
| RESID(-1)^2 | 1.245248 | 0.141044 | 8.828774 | 0.0000 |

Table: 4

Dependent Variable: GDP
GARCH = C(3) + C(4)*RESID(-1)^2 + C(5)*CF + C(6)*CS + C(7)*ER + C(8)
*EX + C(9)*FDI + C(10)*GP + C(11)*IMF + C(12)*MC + C(13)*OP +
C(14)*R

| Variable | Coefficient | Std. Error | z-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.000727 | 0.000408 | 1.784064 | 0.0744 |
| GDP(-1) | 0.920259 | 0.040573 | 22.68140 | 0.0000 |
| | Variance Equation | | | |
| C | 4.36E-06 | 4.33E-07 | 10.07837 | 0.0000 |
| RESID(-1)^2 | 0.171389 | 0.142647 | 1.201490 | 0.2296 |
| CF | -1.08E-05 | 2.54E-05 | -0.425986 | 0.6701 |
| CS | -1.57E-05 | 9.62E-06 | -1.633249 | 0.1024 |
| ER | 7.86E-06 | 2.34E-05 | 0.336621 | 0.7364 |
| EX | -5.33E-06 | 4.45E-05 | -0.119681 | 0.9047 |
| FDI | -1.43E-05 | 5.91E-06 | -2.423129 | 0.0154 |
| GP | -2.60E-05 | 3.76E-06 | -6.909759 | 0.0000 |
| IMF | -5.33E-06 | 9.54E-06 | -0.558409 | 0.5766 |
| MC | -2.10E-06 | 8.40E-06 | -0.250539 | 0.8022 |
| OP | -6.23E-07 | 3.71E-06 | -0.167969 | 0.8666 |
| R | 2.33E-06 | 7.47E-06 | 0.311802 | 0.7552 |

Table: 5

*Dependent Variable: GDP*

| Variable | Coefficient | Std. Error | z-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.000757 | 0.000242 | 3.125363 | 0.0018 |
| GDP(-1) | 0.920396 | 0.025048 | 36.74503 | 0.0000 |
| | Variance Equation | | | |
| C | 5.15E-06 | 2.49E-07 | 20.70086 | 0.0000 |
| RESID(-1)^2 | 0.171304 | 0.136230 | 1.257464 | 0.2086 |
| IW | -4.26E-06 | 2.91E-07 | -14.62065 | 0.0000 |
| GFC | 4.29E-06 | 3.87E-07 | 11.08860 | 0.0000 |
| SEP | -2.33E-07 | 2.63E-07 | -0.887184 | 0.3750 |

Table: 6

Dependent Variable: GDP

| Variable | Coefficient | Std. Error | z-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.000748 | 0.000922 | 0.811141 | 0.4173 |
| GDP(-1) | 0.920216 | 0.081211 | 11.33124 | 0.0000 |
| | Variance Equation | | | |
| C | 4.47E-06 | 2.09E-06 | 2.135554 | 0.0327 |
| RESID(-1)^2 | 0.149927 | 0.127785 | 1.173280 | 0.2407 |
| GARCH(-1) | 0.599855 | 0.181159 | 3.311206 | 0.0009 |
| CF | -3.48E-05 | 6.09E-05 | -0.571142 | 0.5679 |
| CS | -2.03E-05 | 1.79E-05 | -1.134129 | 0.2567 |
| ER | -1.51E-05 | 2.89E-05 | -0.520867 | 0.6025 |
| EX | -4.24E-05 | 7.63E-05 | -0.555483 | 0.5786 |
| FDI | -8.35E-06 | 1.77E-05 | -0.472340 | 0.6367 |
| GP | -3.53E-05 | 1.18E-05 | -3.005252 | 0.0027 |
| IMF | -1.33E-05 | 2.05E-05 | -0.646774 | 0.5178 |
| MC | -1.48E-05 | 1.71E-05 | -0.870145 | 0.3842 |
| OP | 2.69E-06 | 7.84E-06 | 0.343219 | 0.7314 |
| R | -4.69E-06 | 1.66E-05 | -0.281951 | 0.7780 |

Table: 7

*Dependent Variable: GDP*

| Variable | Coefficient | Std. Error | z-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.000531 | 0.000297 | 1.785965 | 0.0741 |
| GDP(-1) | 0.947372 | 0.031836 | 29.75789 | 0.0000 |
| | Variance Equation | | | |
| C | 3.43E-06 | 7.17E-07 | 4.783595 | 0.0000 |
| RESID(-1)^2 | -0.038532 | 0.002717 | -14.18422 | 0.0000 |
| GARCH(-1) | 0.583054 | 0.080733 | 7.222049 | 0.0000 |
| GFC | 1.95E-06 | 4.09E-07 | 4.773620 | 0.0000 |
| IW | -3.16E-06 | 8.40E-07 | -3.764803 | 0.0002 |
| SEP | 7.02E-08 | 4.79E-07 | 0.146620 | 0.8834 |