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THE RELATIONSHIP BETWEEN MONEY SUPPLY, PRICE LEVEL AND ECONOMIC GROWTH IN PAKISTAN: KEYNESIAN VERSUS MONETARIST VIEW

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Abstract: *The objective of the study is to examine the relationship between money supply, price level and economic growth in the context of Pakistan by using Autoregressive Distributed Lag (ARDL) model, covered a period of 1980 to 2016. The results confirm the long-run relationship between the variables while using broad money supply as a response variable. However, in the price and income modeling, the variables do not support the cointegration relationship between the variables. The causality results confirmed the unidirectional relationship running from income to money supply, which implies that income do causes money supply in the short run, whereas money supply leads to inflation to support Monetarist view of inflation in a country. The results conclude that economic growth is imperative to stabilize money supply and price level through sound economic policies in a country.*

Keywords: *Money supply; Income; Price level, ARDL; Pakistan.*

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1. INTRODUCTION

1. Introduction

Monetarist believes that money supply leads to inflation, as it's served as store of value used for speculation purpose. Money supply may rise to the general price level, i.e., a small rise in price level is considered as a stimulus for economic growth but if this trend goes beyond the limits, it adversely affects the economies in the form of high price level (Davidson & Weintraub, 1973). The relationship between income, money and price level is widely debatable topic now-a-days. The speculative demand for money plays a vital role in boosting future returns in the form of income, which empshzied the need to study national income accounting in a given context (Goldfeld & Sichel, 1990). The practicing for printing new currency may raise some serious long term and short term repercussions, for example, we consider a case of Pakistan economy, where the price level substantially goes beyond to the limit due to economic depression in the 1990s, nominal GDP increases but the purchasing power remains the same with a factor of just rise in the price level (Agha & Khan, 2006). There is a very close link between money supply, price level and national income. Therefore, we intend to find out the relationship among the variable with reference to Pakistan in the light of Monetarist and Keynesian literature.

There are majorly two schools of thought that have strong viewpoints regarding the role of money, income and price relationship i.e. Monetarists school and Keynesian school (Lavoie, 1984). According to the Monetarist, money has a leading role in determining prices and income in the economy. They proposed the quantity theory of money (QTM) by Milton Friedman, which explains that there is a proportional relationship between price level and the amount of money that is circulating in economy. If money supply increases the same level rise can be seen in the price level of goods and services in the country, therefore, by the increase in money supply the people will buy same amount of goods at higher prices. For the progress and expansion of economic activities money supply is a key factor. Prices should remain stable in the economic system, because inflation has worse effect on the economy (Friedman, 1989).

Keynesians suggested that the change in income brings change in money stock due to change in aggregate demand of the economy. They focused much on the demand side factors of the economy. They are in opinion that economy can be controlled at best by the demand that is made for goods and services. It takes a lot of time for the economic system influenced by the monetary actions to give the

results. Keynesians have a strong suggestion that prices are somewhat less flexible (Ball & Romer, 1990).

There are controversies among different school of thoughts regarding the relationship of income, money and price and also about their interrelationships. These variables are considered very much important and a lot of work has been done about the working of them across countries because links between them if defined in a clear way provide a strong background to devise monetary policy and effective implications. Empirical evidences provided ambiguous results therefore; there is a need to find out more strong evidences to support the links among the money-income-prices in the developing country like Pakistan.

New classical and new Keynesians are in a thought that the monetary policies have deeper effect to influence the economy. Monetary policies if devised properly play vital role and help the government to overcome the problem of unemployment, inflation and the output level. So it is very crucial to investigate that either the supply of money has an effect on the level of output or the level of output changes may bring change in supply of money (Hall, 1989).

This study intends to investigate the money-income-price nexus by employing an Autoregressive Distributive Lag (ARDL) model because this methodology overcomes the problems of autocorrelation and heteroskedasticity among the variables by taking sufficient lags for the regressors and regressand. The main research question is how real GDP is caused by fiscal and monetary policy by investigating the effectiveness of monetarist and Keynesian school of thoughts.

2. LITERATURE REVIEW

The investigated empirical literature of different regions over different time periods gives conflicting results among the relationship of money, income and price level. Hussain (1982) done the conclusive findings among the stated macroeconomic factors in Pakistan. The results conclude that economic activities in the country are more prone to fiscal actions as compared to the monetary activities and they are faster in pace and can be predicted. The drawback of the model is single equation it is not derived by the larger model so there is a chance of omission of important information. Hussain and Bilquees (1991) and Sims (1972) found interesting results, i.e., (i) from monetary base to GNP there is a unidirectional causality, (ii) The same causality is running in between M2 to GNP and GNP to M2 via two way linkages. The findings of the results have some sensitivity issues regarding lags in the Sims test but there is no justification about

the lag of one period that is used in the study either no statistical and economic justification is provided, test which is a t-test of a single coefficient to show the direction of causality. VAR model is used to analyze the result of monetary issues in Pakistan and this approach is used by Chishti et al. (1992). The findings confirmed the unidirectional causality running from money supply to output, the price has no effect to change in money but money do cause a change in price level. Momen (1992) selected a panel of 10 countries including Pakistan; these countries mostly are agricultural and industrial economies. The results show that in industrial countries, causality is running from money supply to real GDP that confirm the monetarist view, but in countries which are agricultural base like Pakistan the causality runs in reverse direction. Ahmed (2002) showed the causality relationships among some crucial macroeconomic variables and found the bidirectional causality running between money supply and price level in Pakistan. The limitation of the study is to ignore the dynamic analysis. It does not apply the variance decomposition (VDCs) and impulse response function (IRFs), which may gives sound inferences in inter-temporal framework. Mehmood and Arby (2005) examined the long run and short run association among income, money and price in Pakistan. The results argued that the main target is the money supply not the interest rate. It shows improvement in the past studies but with some limitations, i.e., (a) F- test is used which is bi-variate causality test not the multivariate one .The test named likelihood ratio can do this task (Enders, 2004). Abbas and Hussain (2006) examined the bi-variate and tri-variate causal association between money and income and between money and price level in Pakistan. The end result shows the bi-variate causality between money and prices, as there is monetary expansion so the inflation is largely increased in a country. Money supply is the main predictor of the study. An investigation is further done by Khan (2008). The monetary policy shocks leads to the following outcomes (I) there is increase in industrial output which comes back to its original position over 23 to 32 months, (ii) there is an increase in inflation rate, (iii) the dominant factors are nominal shocks in explaining the changes in inflation. The study has following apprehensions, i.e., the proxy of GDP is used which is industrial production index (IPI) 7 percent increment is realized in CPI during 12 months after the shocks and this goes to 90 percent during 18 months. So there is some complication by using IPI as a proxy of GDP. Hussain and Rashid (2009) investigated the relationship between money supply and two other macroeconomic variables i.e. the price level and income. The active role is played by the money supply to change the price level during the sample period. The following are the limitations of the study, i.e.,

(a) the bi-variate causal analysis is used, while multi-variate analysis is deem desirable, (b) The annual data includes pre-1971 period, which may raise a problem of Bangladesh data included in a country, (c) OLS estimation technique is used, while many other robust techniques available. Demery et al. (1984) investigated the data in case of West Germany. The study found that money growth affects real variables. Jiranyakal & Brahmasrene (2007) found the causal relationship between economic development & size of the government, and showed that there is unidirectional causality among economic growth, public spending & money supply. Lee and Li (1983) documented causality among money income & price in Singapore and the found bidirectional causality between income & money supply and unidirectional causality is running from money supply to price level. Khan and Siddiqui (1990) found unidirectional causality running from income to money supply and bidirectional causality between money supply & price level in Pakistan. Giap Tan and Cheng (1995) found bidirectional causality between money supply and output of Malaysia. Bengali et al (1999) examined bidirectional causal relationship between money and income and unidirectional causal relationship from money supply to price level in Pakistan. Ashra et al (2004) found bidirectional causality between money supply & price level in India. Table 1 shows some literature support for Monetarist and Keynesian theory across countries.

Table 1. Literature Support to Monetarist and Keynesian across Countries

Authors	**Conclusion supports**
Hussain and Rashid (2009)	Monetarist
Khan (2008)	Monetarist
Demary et al. (1984)	Monetarist
Ahmed (2002)	Bidirectional causality
Mehmood and Arby (2005)	Monetarist
Jiranyakul & Brahmasrene (2007)	Unidirectional causality
Hussain & Bilquees (1991)	Unidirectional causality
Hussain (1982)	Keynesian
Momen (1992)	Monetarist
Chishti et al. (1992)	Monetarist
Giap Tan and Cheng (1995)	Bidirectional causality
Sims (1972)	Unidirectional causality

3. DATA AND METHODOLOGY

The study used money supply, price level and economic growth in the context of Pakistan by using a time series data from 1980 to 2016. Gross Domestic Product (GDP) served as a proxy for country's income in current US dollar, broad

measure of money supply (M2) measured in annual % of broad money growth and use as a proxy of money. M2 comprises of currency in circulation, deposits with state bank of Pakistan, demand deposits, time deposits and resident foreign currency deposit that are in scheduled banks. Consumer price index is served as a proxy for price level with the base year (2010=100).

3.1. Data Sources

The data is collected from World Development Indicator (WDI) and Economic Survey of Pakistan, various issues. The data is gathered about 36 years for the country Pakistan. The casualty among money supply, income and price level give us conclusive findings about possible policy adoption in a given country context.

3.2. Methodology

The followed model is used for empirical illustration, i.e.,

$$GDP_t = a_1 + a_2M2_t + a_3CPI+U_t \quad (1)$$

$$M2_t= a_1+a_2\ GDP_t+ a_3\ CPI + U_t \quad (2)$$

$$CPI_t= a_1+a_2GDP_t+a_3M2_t+U_t \quad (3)$$

Where, GDP shows Gross Domestic Product, M2 shows broad money supply, CPI shows Consumer price index, 't' is time period, and μ is error term.

The Auto Regressive Distributed Lag (ARDL) model is used for empirical illustration, which is developed by Pesaran et al. (2001). ARDL is used because of several important reasons of the technique. It can be easily applied to, without taking it in to account that the variables in the study are stationary at level or at first difference. It provides the more statistically significant approach even for the small samples than any other technique. When regressors in the model are endogenous, so there is unbiased long-run estimations and it is valid to test according to bounds testing approach. The data generation of the model is taken by sufficient number of lags when the modeling is general to specific. ARDL helps in the derivation of Error Correction Term (ECM) through linear transformation without ignoring the long -run information (Boutabba, 2014)

ARDL can be applied even if the variables are I (0) and I (1). However if the variables are having I(2) the F-statistic that is given by Pesaran et al. (2001) become invalid. The ARDL procedure implement the unit root test only that none of the variable is integrated at I (2) or beyond that. To check that the variables are stationary or not we use the unit root analysis, to see long run relationship among variables the auto regressive distributed lag model and to check short run relationship Error correction method has been implemented.

3.2.1. Unit root test

The most popular technique used to convert data from non stationary to stationary (Mohammad, 2009). The error term for two consecutive time period is uncorrelated then the Dicky-Fuller test can be applied as follows:

$\Delta Y_t = \alpha_2 \delta Y_{t-1} + \varepsilon$……with no Trend and intercept

$\Delta Y_t = \alpha_1 + \alpha_2 \delta Y_{t-1} + \varepsilon$……with drift

$\Delta Y_t = \alpha_1 + \alpha_2 t + \alpha_3 \delta Y_{t-1} + \varepsilon$…..with Trend and Drift

Three models variables can be verified for the process of stationary by the above procedure. When supposition of the error term is uncorrelated is relaxed then the testing procedure of Augmented Dicky-Fuller is most widely used and it is as follows:

$\Delta Y_t = \alpha_2 \Delta Y_{t-1} + \delta Y_{t-1} + \varepsilon$…..with no intercept and trend

$\Delta Y_t = \alpha_1 + \alpha_2 \Delta Y_{t-1} + \delta Y_{t-1} + \varepsilon$…….with intercept

$\Delta Y_t = \alpha_1 + \alpha_2 t + \alpha_3 \Delta Y_{t-1} + \delta Y_{t-1} + \varepsilon$…..with trend and intercept

3.2.2. Cointegration Analysis

The ARDL procedure is going to be estimated through the following equation, i) when the change in money supply bring change in GDP, i.e.,

$\Delta GDP_t = \alpha_0 + \sum \alpha_{1i} \Delta GDP_{t-i} + \sum \alpha_{2i} \Delta MS_{t-i} + \sum \alpha_{3i} \Delta CPI_{t-i} + \lambda_1 GDP_{t-1} + \lambda_2 MS_{t-1} + \lambda_3 CPI_{t-1} + \mu_t$ …… (1)

ii) when there is a change in income to cause a change in money supply, i.e.,

$\Delta MS_t = \beta_0 + \sum \beta_{1i} \Delta MS_{t-i} + \sum \beta_{2i} \Delta GDP_{t-i} + \sum \beta_{3i} \Delta CPI_{t-i} + \lambda_1 MS_{t-1} + \lambda_2 GDP_{t-1} + \lambda_3 CPI_{t-1} + \mu_t$……. (2)

iii) when price is dependent variable, it brings change in money supply and income, i.e.,

$\Delta CPI_t = \beta_0 + \sum \beta_{1i} \Delta CPI_{t-i} + \sum \beta_{2i} \Delta GDP_{t-i} + \sum \beta_{3i} \Delta MS_{t-i} + \lambda_1 CPI_{t-1} + \lambda_2 GDP_{t-1} + \lambda_3 CPI_{t-1} + \mu_t$……. (3)

The first difference operator is denoted by the symbol Δ, α_0 is the intercept in equation system and residuals are denoted by μ_t, the variables are GDP, M2 and CPI which are explained above. All the terms which are having summation sign with that represent the error correction dynamics; the remaining part of the equation which is having the sign λ with it depicts the long run relationship. The time related changes can be incorporated with this equation. The null hypothesis of no cointegration is tested by joining both F-statistic and Wald statistic in the bounds testing procedure.

The two sets of critical values for given significance level is reported by Pesaran et al. (2001) and Narayan & Smyth (2005). The assumption is that one set

of critical values included in ARDL model are stationary at level that is I(0), while the calculation of other is assumed to be stationary at first difference that is I(1). If the calculated value of test statistic exceeds the upper critical bounds value, then the null hypothesis is rejected, if the computed values fall within the bounds then co integration test becomes inconclusive. When this is going to happen the error correction term is a useful way to show co integration, If the computed value of F-statistic is lower than the lower bounds value

The cointegrating relationship is specified by the above equations, after that the reduced form of the equation is used for the long run conditional relationship. So the short run causality is specified by the following ARDL technique of testing.

$$\Delta GDP_t = \alpha_0 + \sum\alpha_{1i}\,\Delta GDP_{t-i} + \sum\alpha_{2i}\,\Delta MS_{t-i} + \sum\alpha_{3i}\,CPI_{t-i} + \eta ECT_{t-1} + \mu_{1t} \ldots\ldots \quad (4)$$

$$\Delta MS_t = \beta_0 + \sum\beta_{1i}\,\Delta MS_{t-i} + \sum\beta_{2i}\,\Delta GDP_{t-i} + \sum\beta_{3i}\,\Delta CPI_{t-i} + \eta ECT_{t-1} + \mu_{1t} \ldots\ldots\ldots \quad (5)$$

$$\Delta CPI_t = \gamma_0 + \sum\gamma_{1i}\Delta CPI_{t-i} + \sum\gamma_{2i}\,\Delta GDP_{t-i} + \sum\gamma_{3i}\Delta MS_{t-i} + \eta ECT_{t-1} + \mu_{1t} \ldots\ldots\ldots\ldots \quad (6)$$

Here, Δ is the operator use for the difference and ECT is the error correction term that is derived when the long run cointergration analysis is done for the above ARDL model.

Using equation 4, 5, 6 the Granger-causality test is applied. According to the Engle & Granger (1987) when the Granger causality is performed at first difference by using vector auto regression modeling it will be misleading. That's why we introduce here the error correction term which shows not only the causality direction but also gives the difference between long run and short run causality. The confirmation of the long run causality is when there is a negative sign and the lag EC term is statistically significant present in ARDL model.

4. EMPIRICAL RESULTS

Table 2 shows the unit root estimates for ready reference.

Table 2. Results of ADF Unit Root Test

Variables	Augmented Dickey Fuller(ADF)					
	LEVEL			1st difference		
	ADF Statistic	Critical Values	P-values	ADF Statistic	Critical Values	P-values
Ln(GDP)	0.487	1% -3.626 5% -2.945	0.983	-5.709	1% : -3.632 5% : -2.948	0.000 *
Ln(CPI)	-0.130	1% : -3.699 5% : -2.976	0.936	-4.054	1% : -3.711 5% : -2.981	0.004 *
Ln(M2)	-3.893	1% : -3.679 5% : -2.967	0.005	-4.286	1% : -3.689 5% : -2.971	0.002 *

Note: * Level of significance at 5%.

Akaike information criterion is used to test the unit root with the lag length 9 where GDP, CPI and M2 are stationary at first difference having trend only. Table 3 shows the Bounds test for cointegration among income, money supply and price level. The cointegration among the variables is accepted on the basis of F-statistics. The criteria are that if significance of lagged values of variables present in the study rejects the null hypothesis, which is the hypothesis of no cointegration. In the present findings lag length is fixed up to four and the optimal lag length is fixed by AIC criterion in the ARDL model.

Table 3. Bounds Test Approach to Cointegration

Variables	Critical value bound			F-statistics	Cointegration
	Significance	Upper bound	Lower bound		
Ln(GDP)	At 10% At 5 % At 2.5% At 1%	3.17 3.79 4.41 5.15	4.14 4.85 5.52 6.36	0.391	No Cointegration
Ln(CPI)	At 10% At 5 % At 2.5% At 1%	3.17 3.79 4.41 5.15	4.14 4.85 5.52 6.36	1.471	No Cointegration
Ln(M2)	At 10% At 5 % At 2.5% At 1%	3.17 3.79 4.41 5.15	4.14 4.85 5.52 6.36	9.957	Cointegration

The results show that GDP and CPI model both exhibit no cointegration relationship between the studied variables, while in third model that is related with money supply confirmed that the model exhibit a long-run and cointegrated relationship between the variables. The value of F-statistic for M2 model shows the estimated value of 9.957 that is significant at 99% confidence interval, which is estimated is higher than the upper bound value. Hence, we conclude that there is a long run cointegration relationship among prices and income when money supply is dependent variable. Price modeling and income function both does not confirm the cointegrated relationship between the variables, as F-statistic values are 1.471 and 0.391 fall in the lower bound value. The causal relationship and dynamics are estimated for the variables, i.e., price level, income and money supply by using F-statistic. Table 4 shows the empirical results of short –run causality for money supply, price level and income model in a given country context.

Table 4. Empirical results for short run causality

1. M2 as dependent variable				
Variables	Coefficient	Standard error	t-statistics	P- value
Δ(LM2(-1))	0.346	0.163	2.116	0.043 **
Δ(LGDP)	0.968	1.141	0.848	0.303
Δ(LGDP(-1))	2.972	1.194	2.488	0.019**
Δ(LCPI)	0.155	0.631	0.246	0.507
2. GDP as dependent variable				
Δ(LCPI)	0.764	0.455	1.678	0.083***
Δ(LCPI(-1))	-0.558	0.445	-1.254	0.219
Δ(LM2)	0.025	0.025	0.973	0.338
3. CPI as dependent variable				
Δ(LCPI(-1))	0.552	0.155	3.545	0.001*
Δ(LCPI(-2))	0.176	0.168	1.051	0.303
Δ(LM2)	0.013	0.009	1.377	0.414
Δ(LGDP)	0.178	0.065	2.737	0.011**
Δ(LGDP(-1))	-0.080	0.090	-0.889	0.382
Δ(LGDP(-2))	0.159	0.067	2.356	0.026**

Note: *, **, *** represent 1%, 5% and 10% level of significance.

Table 3, Part (a) shows the result of short run causality, which explains that income has a positive impact on money supply, which implies that higher income largely support to increase more investment in a country that exceeds money supply in a country (see, Putnam & Wilford, 1978). In part (b), the relationship between higher price level and country's economic growth is positive, which implies that at a certain threshold, higher price level support to increase per capita

income, however, after pass certain threshold, changes in price level may lead serious economic distortions in a country that need to be controlled by appropriate economic policies (Sidrauski, 1967). In part (c), the empirical results confirmed that income enlarge the price level in a country to achieve short-term objectives, while in the long-run, it is need to limitize higher price level to support country's socio-economic objectives (see, Cunado & De Gracia, 2005). The pair wise Granger causality shows that if the p values are less than the specified level of significance, the null hypothesis is going to be rejected and alternative hypothesis will be selected as shown in Table 5.

Table 5. Granger Causality

Null Hypothesis	F-statistics	P-Values
Ln(GDP) does not Granger Cause Ln(M2)	3.598	0.039**
Ln(M2) does not Granger Cause Ln(GDP)	0.655	0.526
Ln(CPI) does not Granger Cause Ln(M2)	0.933	0.404
Ln(M2) does not Granger Cause Ln(CPI)	2.772	0.078***
Ln(CPI) does not Granger Cause Ln(GDP)	0.368	0.904
Ln(GDP) does not Granger Cause Ln(CPI)	1.754	0.190

Note: **, *** represents 5% and 10% level of significance respectively.

The results show that GDP Granger cause money supply but this relationship not confirm by other way around, which implies that economic growth is imperative for broad money supply in a country. The results further confirm the one –way linkage running from money supply to price level in a country, which confirmed the Monetarist view of inflation **(see, Fischer & Mayer, 1981).** Table 6 shows direction wise causality among the variables for ready reference.

Table 6. Direction wise causality

Variables	Directions	Symbols
LGDP and LM2	Unidirectional	→
LM2 and CPI	Unidirectional	→
LCPI and LGDP	No Direction	#

The result implies that when there is a rise in income, there should be a rise in money supply to overcome the gap generated by increase in income. When inflation rate boosts up in the economy, the inflation can be accommodate by increase in money supply and this money supply increment again increases the price level in the economy. When price level increases production is going to increase because producers can get higher gains by increase in prices then there is an increase in income of the country. Figure 1 shows the confidence ellipse to check model stability.

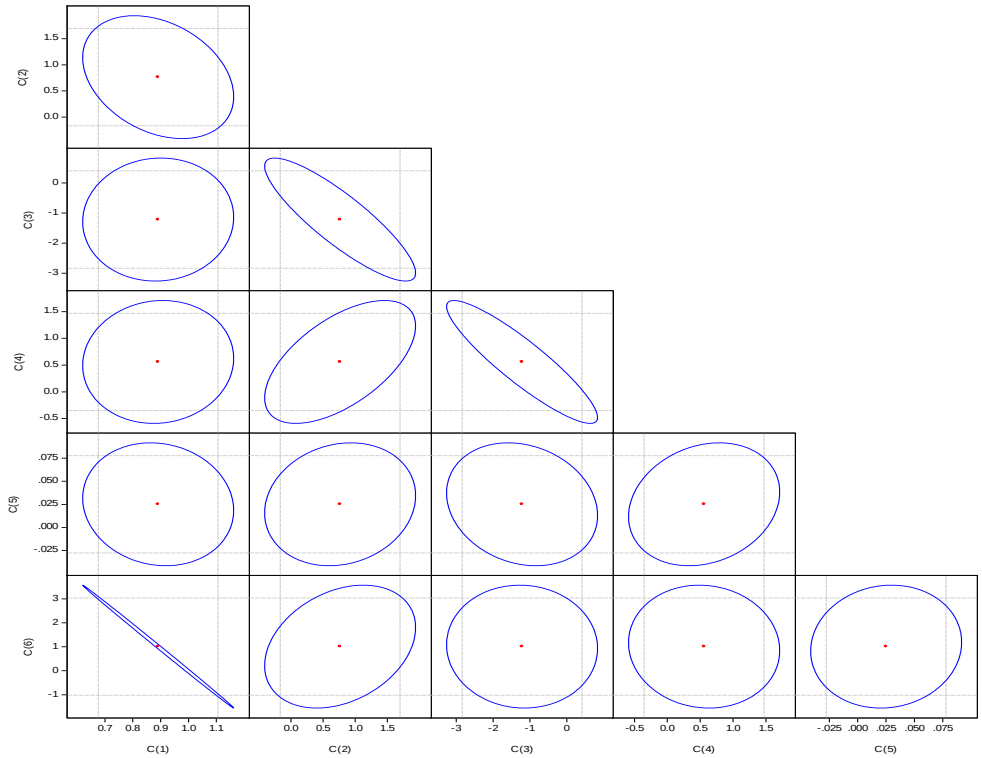

Figure 1. Confidence Ellipse

Figure 1 shows the corresponding confidence interval for the individual coefficients. The above figure explains that according to coefficient estimates these are highly correlated, if the coefficient estimates are independent of each other the ellipses would be exactly like circles. It shows that model is stable in the long run at 5% level of significance.

5. CONCLUSION AND POLICY IMPLICATIONS

The study analyze the long-run and causal relationship between money supply, price level and economic growth in a context of Pakistan by using the data from 1980-2016. The investigation of the variables for long run cointegration is determined by the ARDL bounds test for cointegration. The bounds testing approach confirmed that the model exhibit the long-run and cointegrated relationship between the variables when broad money supply served as a regressand, while in other two models, i.e., price model and income model, both does not fall in the upper bound critical values, hence we may not conclude in favor of cointegrated relationship between the variables. The short-run dynamics show that i) economic growth positively influenced broad money supply, ii) price level increases country's economic growth, and iii) economic growth increases price level in a country. The causality result confirmed the one –way linkages running from economic growth to money supply, and money supply to price level, which confirmed the Monetarist view of inflation in a country. The results conclude that fluctuations in price level in the short run must be stabilize with cautions through the active monetary policy, as if it will not to do with cautions it will be serious impact and intensify the price fluctuations in long run. Money supply is allowed to grow as per the real output of the economy. When money growth is increasing excessively it causes increase in price level in a country. The contractionary monetary policy is imperative to stabilize country's excessive money supply in a country.

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