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An Imperative Study on Antecedents of an Economic Recession

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Abstract—

A period of temporary monetary decline during which trade and industrial activities are slowed down, generally identified by a fall in GDP (Gross Domestic Product) in two successive quarters is an indicator of an economic recession. Key factors stipulating to a recession cycle are discussed and results are inspected mathematically by reckoning economies of five influential countries in the world. This paper investigates the impact of inflation and higher interest rates on the economy of a country. Collateral data has been accumulated from the websites of World Bank and Statistics Times for the sake of accuracy. To assess the impact of these two factors on GDP, multiple correlation analysis has been used. The results suggest that higher interest (lending) rates and inflation are positively correlated. Collectively these two factors have been shown to produce negative long term impact on GDP and hence a recession is forecasted. It is empathetically established that these two aspects may beset an on-going economy.

Keywords— Economic Recession, GDP (Gross Domestic Product), Inflation, Interest (lending) Rates, Multiple Correlation.

I. INTRODUCTION

Recession generally means a plunge in economy of a country and is typically indicated by two consecutive quarters of declining real GDP. Recessions are primarily caused by a fall in aggregate demand due to which unemployment increases and asset prices decrease. Many factors contribute to an economy's falling into recession; such as financial crisis, rise in interest rates, fall in asset prices, high inflation rate, crash in stock markets etc. These factors highlight certain economic relationships with GDP which is a marker of growth or downfall of an economy. The relationship between inflation and growth is not clear, but higher inflation accompanied by higher interest (lending) rates seem to have long term impact on GDP of an economy. Inflation refers to a general rise in the prices of goods and services over a period of time. Inflation can occur for various reasons such as increased production costs, natural calamities, black marketing, higher energy costs, national debt and many other reasons. Inflation directly affects the credit market (loans) and higher interest rates make borrowing more costly and subsequently GDP experiences a downfall. The right level of relationship between economic growth and inflation is somehow debatable. At one extreme, an economy that is growing too fast can experience hyperinflation which influences credit market and gradually downturns production rate and a recession cycle gets under way. At the other extreme, an economy with no inflation is essentially stagnated in long run and corrective measures need to be taken to put it back on track.

A large number of economic theories have been floated to study impact of inflation on economic growth. Many of them suggest a positive relationship between inflation and growth. However in 1970s the concept of stagflation got spurred and the validity of the positive relationship was questioned. This was evidenced by periods of low or negative output growth while inflation rates were historically high. During this period, prices rose sharply while the economies around the world were experiencing massive unemployment. As studied by Ball [1], Ghosh & Phillips [2] and Khan & Senhadji [3], inflation has long term adverse effect on economic growth and a weak negative correlation exists between inflation and economic growth. Dewan et.al [4] found that inflation had a bearing in the difference between actual GDP and potential GDP (output) of Fiji's economy. In another study, Dewan & Hussein [5] found in a sample of 41 developing countries including Fiji, that inflation was negatively correlated to growth.

Inflation and interest rates are linked and frequently inspected in macroeconomics. Inflation is a key factor in matters which affect interest rates. Some theories suggest that lower interest rates put more borrowing power in the hands of consumers and when consumers spend more, the economy grows, naturally creating inflation. While another important interpretation is that when a surge in inflation occurs, value of money decreases. Lenders are very much aware that inflation will erode the value of their money over the time period of a loan, so they increase interest rates to compensate for the losses. As a result, interest rates tend to increase with inflation. Darby [6], Million [7], Tobin [8] and Fave & Auray [9] have all verified positive relationship between inflation rate and interest rate. On the other hand, Barsky [10], Huizinga & Mishkin [11] and Ghazali [12] have concluded that there is no strong relationship between interest rate and inflation rate.

Rising interest rates affect both consumers and firms in general. Therefore the economy is likely to experience fall in consumption and investment. Bader & Malavi [13] studied the impact of interest rate upon investment on economic growth in Jordan. Obamuyi & Olorunfemi [14] examined the implications of interest rate behaviour on the economic growth in Nigeria. Study results revealed that high interest rates put adverse impact on economic growth.

Aim of this work is to visualize theoretical perceptions into practical framework. Statistical data for leading economies has been worked upon to investigate cumulative effect of inflation and high interest rates over the economy of a country. Multiple Correlation has been used to validate the findings. Multiple Correlation analysis is commonly employed to investigate strength of association between two or more independent variables with a dependent variable as done by Cohen & Cohen [15], Cohen [16] and Nimon [17].
This paper is organized into four sections. Section I is introductory highlighting the impact of inflation and interest rates on economy of a country. A brief history of previous studies which were referred for this work has been given. Section II describes the problem under consideration and introduces an application. Section III explains the methodology to work out the problem using multiple correlation. Finally we draw some conclusions, followed by giving applications for further research in section IV.

II. PROBLEM STATEMENT

After the much publicized word wide recession of 2008 -2009, which devastated economies of United States and nearly all other major countries of the world, economists are now ruminating whether China could lead the world into another recession. It's a known fact that GDP is the key marker of economic growth of a country. This study is designed to investigate the effect of the basic economic factors viz. interest rate and inflation rate on GDP. The objectives of this work are as follows:

1. To study the relation between interest (lending) rates and inflation.
2. To study individual and combined effect of interest rates and inflation on GDP and hence identify the underlying causes which push an economy into an economic recession.

III. RESEARCH METHODOLOGY

Data was collected from the websites of World Bank and *Statistics Times for* Inflation Rate, Interest (lending) rates and GDP in 5 influential countries viz. Australia, Canada, China, India and United States for the period 2013 and 2014. The purpose of this study is to find the individual and combined impact of interest rate and inflation on economic growth. Statistical data for the three entities as per given sites in year 2013 and 2014 is given in Table 1:

Table 1: Inflation Rates, Interest Rates and GDP for years 2013 and 2014

Country	Inflation Rate (x)		Interest (Lending) Rate (y)		GDP (billion $) (z)	
+	**2013**	**2014**	**2013**	**2014**	**2013**	**2014**
Australia	-0.3	1.6	6.2	6.0	1,501.883	1,444.189
Canada	1.4	1.8	3.0	3.0	1,838.964	1,788.717
China	2.2	0.8	6.0	5.6	9,469.125	10,380.380
India	6.3	3.8	10.3	10.3	1,875.157	2,049.501
United States	1.5	1.5	3.3	3.3	16,768.050	17,418.925

To investigate the impact of Inflation Rate (x) and Interest Rate (y) on GDP (z), let 'x' and 'y' be viewed as independent variables and 'z' be dependent variable. Calculating coefficient of correlation in each set taking two variables at a time for the year 2013, as given in Table 2:

Table 2 : Coefficient of Correlation for Each Set for year 2013

r_{xy} = 0.742	$(r_{xy})^2$ = 0.5506
r_{xz} = -0.1492	$(r_{xz})^2$ = 0.0223
r_{yz} = - 0.4398	$(r_{yz})^2$ = 0.1934

The combined correlation between inflation rate (x) and interest rate (y) with GDP (z) gives measure of the strength of association between two independent variables (Inflation rate & interest rate) and dependent variable (GDP) and is given by 'R' whose range lies within 0 to 1 as given below in equation 1:

$$R = \sqrt{\frac{(r_{xz})^2 + (r_{yz})^2 - 2r_{xy}\, r_{xz}\, r_{yz}}{1-(r_{xy})^2}} \qquad \text{-------- (1)}$$

$$\Rightarrow \quad R = \sqrt{\frac{0.0223 + 0.1934 - 2\,(0.742)(-0.1492)(-0.4398)}{1-\,0.5506}} \qquad \text{-------- (2)}$$

Hence as given by equation (2), R = 0.5130
Similar computations are done for year 2014 as shown below in Table 3:

Table 3 : Coefficient of Correlation for Each Set for year 2014

r_{xy} = 0.7569	$(r_{xy})^2$ = 0.5729
r_{xz} = -0.4718	$(r_{xz})^2$ = 0.2226
r_{yz} = - 0.4307	$(r_{yz})^2$ = 0.1855

$$R = \sqrt{\frac{0.2226 + 0.1855 - 2\,(0.7569)(-0.4718)(-0.4307)}{1 - 0.5729}} \quad \text{--------- (3)}$$

Hence R = 0.6355, as given by equation (3)

Interpretation of Results:

1. Strong +ve Correlation between Inflation and Interest Rate
2. –ve Correlation between Inflation and GDP
3. –ve Correlation between Interest Rates and GDP
4. Inflation in general is inversely proportional to GDP as shown in Table 4 and Fig. 1.

Table 4: Variation of GDP with Inflation Rate

Inflation Rate Difference (2013 - 2014)	GDP Difference (2013 - 2014)
+1.9	-57.694
+0.4	-50.247
-1.4	+911.255
-2.5	+174.344
0	+650.875

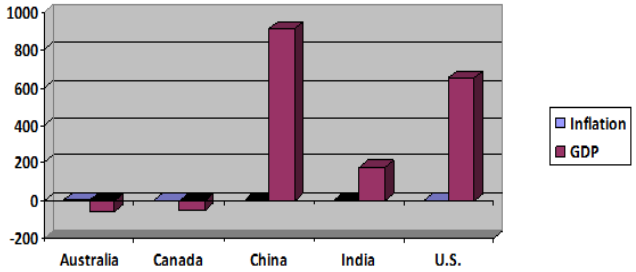

Fig. 1: 3- D plot of variations of GDP with inflation rate

5. No significant variations in Interest Rates are seen in 2013-2014, so no interpretations on variation in interest rates with GDP.
6. It is conspicuous to note that 'R' (multiple coefficient of correlation of variables x and y with z) tells only the strength of the association and not the direction unlike 'r' (coefficient of correlation between two variables) which gives both strength and direction and hence 'R' is never negative. Yet it is clear that GDP bears inverse relationship with Inflation rate and Interest rate as both r_{xz} and r_{yz} are negative.

IV. CONCLUSIONS

The simplest definition of economic growth can be stated as the increase in the Gross Domestic Product (GDP) of a country. Inflation and Interest rates are the two major antecedents which affect GDP of an economy. Their up and down volatility is closely related to factors extending to influence economic growth rate of a country. This paper uses multiple correlation analysis to provide empirical evidence about the long term relationship between these two factors with GDP of an economy. In most recent periods, when inflation rate has been considerably deflated in developing countries due to many factors including abatement in petroleum prices, this effect becomes quantitatively more significant. This result is in agreement with the traditional view about the existence of an inverse relationship between the retardation of inflation and interest rates with acceleration in growth rate of an economy.

However this relationship is only one way implication. If we look into it the other way round; as a result of too much GDP growth, it is an unsubtle fact that high production brings down unemployment rate and it will most likely come up with an increase in inflation rate, mainly due to two reasons; firstly the aggregate demand for goods and services will increase faster than supply, causing prices to rise and secondly because the companies will have to raise chore wages due to tight labour market. This increase is usually passed on to consumers in the form of higher prices as the company looks to maximize profits which ultimately comes up with higher inflation rate.

Keeping these viewpoints, the limitation of correlational methodology is that, it does not allow two way inferences. For instance two or more variables can be highly correlated for any of the following reasons: (i) X causes Y (ii) Y causes X (iii) Z causes both X and Y, but X and Y are not causally related (iv) X and Y both cause Z, but X and Y are not causally related (v) many other variables might be involved. Thus a bivariate or multivariate correlation coefficient gives information about the nature of the relations between two or more variables, but not why they are related. More sophisticated correlational methods, such as factor analysis, path analysis, or structural equation modeling, have the ability to examine the underlying relations among many variables and can, therefore, be used as a basis to argue for causal inference.

Another limitation of correlational methods is that, they commonly suggest that the variables are linearly related to one another. For example, variables X and Y can be shown to have a linear relationship if the data can be nicely fitted by a

straight line. But when variables are not linearly related, correlational method's induced nonlinear relationships will result in smaller linear correlations, possibly misleading the researcher and the field of inquisition.
Further research work may include these limitations and workout for manifold relationships, incorporating suggested methodologies. Case studies will be included and further research options will be explored.

REFERENCES

[1] L. Ball, Why does High Inflation Raise Inflation Uncertainty?, *Journal of Monetary Economics, Vol. 29,* No.3, 1992.
[2] A. Ghosh and S. Phillips, Warning: Inflation may be Harmful to your Growth, *IMF Staff Papers, Vol. 45, No.4, 1998.*
[3] M. S. Khan and A. S. Senhadji, Threshold Effects in the Relationship between Inflation and Growth, *IMF Staff Papers, Vol. 48 , No.1, 2001.*
[4] E. Dewan, V. Gokal and S. Hussein, Measurement of Underlying Inflation in Fiji, *Working Paper, Reserve Bank of Fiji*, 2003.
[5] E. Dewan and S. Hussein, Determinants of Economic Growth, *Working Paper, Reserve Bank of Fiji*, 2001.
[6] M.R. Darby, The financial and tax Effect of Monetary Policy on interest rates, *Economic Enquiry, (13),* pp. 266-76, 1975.
[7] N. Million, Shifting regimes in the relationship between interest rates and inflation, *proceeding of the 2nd International conference on Economic Policy Modelling*, 2003.
[8] J. Tobin, Money and Economic Growth, *Econometrics (33),* pp. 671-684, 1965.
[9] P. Fave and S. Auray, Interest rate and inflation in Monetary models with ingenious money growth rate, *Economic Bulletin, 5(1),* pp. 1-10, 2002.
[10] R. B. Barsky, The fisher hypothesis and the forecast ability and persistence of inflation, *Journal of Monetary Economics (19),* pp. 3-24, 1987.
[11] J. Huizinga and F.S. Mishkin, inflation and real interest rates on assets with different risk characteristics, *Journal of Finance (43),* pp. 699- 714, 1984.
[12] Ghazali, A. Noor , A long money test of the long-run fisher effect in the G7 Countries, *Applied Financial Economics (13),* pp. 763-769, 2003.
[13] M. Bader and A. Malawi, The impact of interest rate on investment in Jordan: A co integration analysis, *Journal of Econ & Admin, 24(1),* pp. 199-209, 2010.
[14] T. M. Obamuyi, and S. Olorunfemi, Financial reforms: Interest rate behavior and economic growth in Nigeria, *Journal of Applied Finance & Banking, 1.1(4),* pp. 39- 55, 2011.
[15] J. Cohen and P. Cohen, Applied multiple regression/correlation analysis for the behavioral sciences (2nd edition). Hillsdale (NJ), Erlbaum, 1983.
[16] J. Cohen, *Applied Multiple Regression (Correlation Analysis for the Behavioral Sciences*, ISBN 0805822232, 2002.
[17] K. Nimon, M. Gavrilova, M., & J. K. Roberts, Regression results in human resource development research: Are we reporting enough? In C. Graham & K. Dirani (Eds.), Proceedings of the Human Resource Development, International Conference, pp. 803- 812, Knoxville, TN: AHRD, 2010.

WEBSITES

[18] http://data.worldbank.org/indicator/NY.GDP.DEFL.KD.ZG
[19] http://data.worldbank.org/indicator/FR.INR.LEND
[20] http://statisticstimes.com/economy/world-GDP-ranking.php
[21] http://mtweb.mtsu.edu/stats/regression/level3/multicorrel/multicorrcoef.htm
[22] http://www.investopedia.com/articles/06/GDPinflation.asp

