An Analysis of Interest Rate Determination in the UK and Four Major Leading Economies

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Abstract

This paper reviews basics of the natural rate of unemployment, dynamic time inconsistency and policy co-ordination hypotheses that were behind the adoption of the interest rate rules by monetary authorities in recent years. Then it presents a simple Taylor rule of interest determination and its analytical solution using the second-order difference equation technique. Model is estimated using the quarterly time series data on inflation, output and the interest rate for the UK from 1970:2 to 1999:4 and annual data series for five major economies from 1978 to 2000. In both cases we find evidences for such interest rules and the changes in the interest rate to have significant impacts on output, unemployment and inflation. The simultaneous equation method better predicts the actual interest rate than the single equation method applied to each individual economy or to the global economy constructed by pooling cross section and time series of these individual economies.

Key words: Inflation, interest rate, growth, economic policy
JEL Classification: E3 and E4

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I. Introduction

The Monetary Policy Committee of the Bank of England determines the basic interest rate considering the overall macroeconomic situation in the UK and the global economy. The Committee has operational independence since 1997. Similarly the European Central Bank, the Federal Reserve and the Bank of Japan determine interest rates frequently for their respective jurisdictions. What short of macroeconomic models can explain such interest rate decisions and how do such decisions influence economic activities at home and abroad are issues of interest to a wide range of economic decision makers including households, firms, investors and traders in these economies. Here we present a brief background on the evolution of such a rule based policy making over last three decades and test the standard interest rate determination rule proposed by Taylor (1993) and others and discuss if the actual interest rates in then UK and five major economies in the world are close enough to the prediction of the model.

Background for an Interest Determination Model

It is generally believed that the central banks raise the interest rate when economy is experiencing an inflationary pressure to choke off the aggregate demand and lower it when economy is slowing down in order to stimulate spending by households and firms. There has been a long research in this topics as reflected in works of (Keynes (1936), Hicks (1937), Bailey(1956) Phillips (1958), Friedman (1968), Phelps (1968), Tobin (1969)) Taylor (1972) Laidler and Parkin (1975) Kydland and Prescott (1977), Phelps and Taylor (1977) Aghevli (1977), Gordon (1983), Barro and Gordon (1983), Sargent (1986) Goodhart (1989), Nickell (1990), Buiter and Patel (1992), Ball and Romer (1990) Dornbusch (1992), MPC (1999), Lockwood Miller and Zhang (1998), Hall, Walsh and Yates (2000)).

The fundamental ideas behind the Taylor rule emerge from the natural rate of unemployment hypothesis (Friedman (1968) and Phelps (1968)), which states that the money supply can influence output and employment only in the short run but not in
the long run. If policy makers peg monetary policy to lower than the natural rate of unemployment, it only raises the actual and expected prices setting a motion of wage price spiral in the economy. It may lead to an expectation trap (Eichenbaum (1997)). In other words, it is impossible to achieve an unrealistically lower rate of unemployment by means of an expansionary monetary policy. The natural rate of unemployment represents frictional unemployment that depends on job separations and job finding rates. It helps the dynamic adjustment process in a growing economy. Unemployment rate above the NIARU is certainly a cause of concern.

Given the expectation augmented Phillips curve $\pi_t = \alpha(u_t - u_N) + \pi_t^*$ where $\alpha < 0$ the trade-off between inflation and unemployment or output for the short run can be expressed as:

\[
\begin{align*}
\pi_t > \pi_t^* &\Rightarrow u_t < u_N \Rightarrow y_t > y^* \\
\pi_t < \pi_t^* &\Rightarrow u_t > u_N \Rightarrow y_t < y^* \\
\pi_t = \pi_t^* &\Rightarrow u_t = u_N \Rightarrow y_t = y^*
\end{align*}
\]

where $\pi_t$ is the actual inflation, $\pi_t^*$ is the expected inflation $u_N$ is the natural rate of unemployment that is ground out by the Walrasian system of the general equilibrium, and $u_t$ is the actual unemployment rate, $y_t$ is the actual output and $y^*$ is the natural rate of output.

The underlying debate between an active or discretionary monetary policy vs. the Taylor, McCallum or any other rules in the monetary policy is the possibility of real impacts of demand management policy due to an inertia or inflexibility in the labour and goods markets either for reasons of staggered wage contracts or for menu costs or for long term sale-purchase agreement in the goods market (Taylor (1972), Mankiw (1985), Ball and Romer (1990)). The expected inflation influences aggregate supply and aggregate demand first through its impacts in the labour market and secondly through its influence on future expectations. In terms of a simple macro economic model these relations can be expressed in terms of following six equations. Take a cobb-Douglas aggregate production function

\[
y_t = N_t^\alpha \quad \text{in logs} \quad y_t = \alpha n_t
\]

were $Y_t$ is output, $N_t$ is labour input, $\alpha$ is the elasticity of output with respect to the labour input, $\alpha > 0$. Demand for labour is in equilibrium is set where the real wage
rate equals the marginal productivity of labour as: 
\[ \frac{\partial Y_t}{\partial N_t} = \alpha N_t^{\alpha-1} = \frac{W_t}{P_t} \]
where \( P_t \) is the price level, \( W_t \) is the nominal wage rate; taking log it can be written as:
\[ w_t - p_t = \ln(\alpha) + (\alpha - 1)n_t \]  
(3)
Aggregate demand shows link between money supply, price level and output as
\[ \frac{M_t}{P_t} = k_t Y_t \]
where \( k_t \) is a monetary policy parameter; \( k_t = e^{\theta_t} \) where \( \theta_t \) is a random variable and \( M_t \) is money supply. Now taking log of this demand:
\[ m_t - p_t = \ln(k_t) + y_t \text{ or } m_t - p_t = \theta_t + y_t \]  
(4)
Labour supply depends on expected real wage rate, \( \frac{w}{p^e} \). If workers’ expected prices are lower than the actual prices \( p^e < p \), producers find it cheaper to employ more labour by raising wages slightly, which workers take to be real rise in wages, \( \frac{w}{p^e} > \frac{w}{p} \). This happens because workers know their nominal wage rate when they receive payments from their employment and expected prices from their own experience but they do not know the actual price level. The labour supply depends on expected real wage rate where the expectations about the current price level are conditional upon information available up to period \( t-1 \).
\[ n_t^s = \gamma \left[ \left[ w_t - E_{t-1}^s(p_t) \right]/I_{t-1} \right] \]  
(5)
where \( E_{t-1}^s(p_t) \) is the psychological expectation of the period \( t \) price level based on information available up to period \( t-1 \). The labour market clearing condition implies that labour supply equals labour demand in equilibrium, \( n_t^s = n_t^d \) which implies
\[ \frac{1}{\gamma} n_t^s = w_t - E_{t-1}^s(p_t) \]  
(6)
Assuming prices equal to wage rate, \( p_t = w_t \) and solving (5) for the equilibrium value of labour input, i.e. where labour demand equals labour supply:
\[ \frac{1}{\gamma} n_t^s - w_t + E_{t-1}^s(p_t) = \ln(\alpha) + (\alpha - 1)n_t - w_t + p_t \]
\[ \frac{1}{\gamma} n_t^s + (1 - \alpha)n_t = \ln(\alpha) + p_t - E_{t-1}^s(p_t) \]
\[ n_t \left[ \frac{1}{\gamma} + (1 - \alpha) \right] = p_t - E_{t-1}^s(p_t) + \ln(\alpha) \text{ let } \Omega = \left[ \frac{1}{\gamma} + (1 - \alpha) \right] \]
Equilibrium employment \( n_t = \frac{1}{\Omega} \left[ p_t - E_{t-1}^* (p_t) + \ln(\alpha) \right] \) (7)

Two facts from this figure are noteworthy. First, it is possible for the monetary policy to have real impacts in the short run until the economic adjustments take place. Economy may move from point a to b or to d in the short run in response a positive or negative shocks in the aggregate demand. Secondly, these short run gains or losses will disappear after the economy moves back to the its potential natural output level \( y^* \), only leaving their impact on the price level. Monetary policy cannot influence the economy in the long run, rather it can destabilise it by raising or lowering the aggregate demand in the short run. Such instability creates an uncertainty among economic agents by distorting the relative prices of commodities and can have much worse ultimate impacts than the apparent positive impacts in the short run. When the relative prices are disturbed it is difficult for an economic agent to take optimal decisions for consumption and production as he/she is unable to isolate changes in the relative prices from the changes in the aggregate price level. Inflation creates social tension by redistributing income from less to more wealthy people and from lenders.
to borrowers. Moreover such temporary measures may give rise to a notorious time inconsistency and credibility problem in the monetary policy.

Adoption of an active public policy to exploit the possibility of short run trade-offs between unemployment and inflation under Friedman-Phelps-Taylor type natural rate of output and employment model have given rise to the dynamic time inconsistency theories in the last two decades (Kydland and Prescott (1977), Barro and Gordon (1983), Rogoff (1985), Miller and Salmon (1985)). It has prompted literature on central bank independence and policy co-ordination models (Cukierman (1994), Goodhart (1994), Nardhaus (1994) Eijffinger SCW and J.D. Haan (2000)). The main propositions of these various models remain that the government has an incentive or temptation to pursue a higher inflation strategy because it reduces the real value of outstanding debt, or lowers the cost of debt servicing, or makes it easier to finance the budget deficit. Inflation rate and the social costs of inflation and output gap are higher in the discretionary regime than under the policy rule. Furthermore, government has an incentive to cheat public by a surprise or unanticipated inflation when people expect zero or lower rate of inflation. Such a cheating strategy cannot last long as people find out, sooner or later, that they were fooled by the government. This destroys reputation of government about its commitment to a low inflation policy. Credibility in public announcement deteriorates. Workers and unions revise their expected prices. This ultimately triggers the wage price spiral which might prove detrimental to the health of the economy. This possibility of dynamic inconsistency in the economic policy has given rise recently to more thriving literature on and popularity of the central bank independence with monetary rules such as the Taylor or McCallum rules. There is also more emphasis on policy co-ordination between fiscal and monetary authorities at national as well as at international levels (Krugman
(1979), Barro and Gordon (1983), Canzoneri M. B. and J A Gray (1985), Nordhaus (1994), Altig D E, C.T. Carlstrom and K.L. Lansing (1995), Lockwood Miller and Zhang (1998), Corsetti and Pesenti (2001), Benigno(2002)). All these new open or closed economy models emphasise on how credibility and consistency in the fiscal and monetary policy or on how the fiscal-monetary policy mix could be obtained by delegating the inflation controlling role to an independent central bank that systematically adopts a Taylor type rule for the interest rate to achieve a target inflation rate.

II. A Simple Model for the Determination of the Interest Rate

Short term interest rate is a key instrument of a monetary authority. How changes in it affect market rates, asset prices, expectations and the exchange rates and through these prices to the aggregate demand and inflation is discussed in details in the transmission mechanism of the monetary policy (MPC (1999), Bernanke and Miskin (1997)). Changes in the interest rate have profound impacts on saving and consumption behaviours of households, investment and capital accumulation behaviour of firms, and portfolio allocation of domestic and foreign trades in the financial and exchange rate markets. These changes affect the overall demand and supply position in the economy. These changes may occur immediately or over a lag of up to two years. They may also change expectations of these economic events about the future prospects of the economy. Serious welfare and redistribution impacts follow. Analysis of all these far reaching consequences of a change in the interest rate by the central bank require more detailed model for the economy, which is beyond the scope of the current paper. Both econometric and general equilibrium models are found in the literature (Holly and Weale (2000), Altig D E, C.T. Carlstrom and K.L. Lansing (1995)). Here our focus is only to find out whether a type of Taylor rule can
explain variations in the movements in the interest rate in the UK and five major industrial economies in the last three decades.

The Taylor rule model, that we use here, includes mainly three equations. First equation states the current output gap \( y_t - y^* \), the actual output relative to the trend output, as a function of the deviation of the interest rate one period earlier from the target interest rate of the monetary authority \( i_{t-1} - i^* \). We expect this relationship to be negative because higher interest rates slow down expenses by consumers and firms, have a contractionary impact in the economy. This relation can be presented as:

\[
y_t - y^* = -d(i_{t-1} - i^*) \quad d > 0
\]

where \( y_t \) and \( y^* \) are actual and natural level of output, \( i_t \) is the actual rate of interest in period \( t \), \( i^* \) is the interest target of the monetary authority. There is one period lag between the interest rate decision and the change in the output.

Price level in the economy responds to the aggregate supply. The expectation augmented Phillips curve in terms of output can be written as:

\[
\pi_t = \pi^* + c(y_{t-1} - y^*_{t-1}) \quad c > 0
\]

where \( \pi_t \) and \( \pi^* \) are actual and target inflation rates. When the output is above the trend in the last period it creates pressure in the labour market which raises the wage rate. Increase in the wage rate translates into higher prices and higher rate of inflation.

Policy makers like to reduce interest rate when both output and inflation rates are higher. Therefore the interest rate determination rule in simple terms can be written as

\[
i_t = i^* + a(y_t - y^*) + b(\pi_t - \pi^*) \quad a > 0 ; b > 0
\]

If we substitute out output gap from (9) and inflation rate gap from (10) in the interest rate rule in (11) we can see the cycles of interest rate emerging from the reduced form of three equations (9) – (11).

\[
i_t = i^* - ad(i_{t-1} - i^*_{t-1}) - bcd(i_{t-2} - i^*_{t-2})
\]

\[
i_t + adi_{t-1} + bcdi_{t-2} = i^* + adi^*_{t-1} + bcdi^*_{t-2}
\]

The stability or convergence properties of this second order difference equation essentially depends upon the values of the parameters a, b, c and d and two initial
conditions for $i_0$ and $i_1$. For simplicity let us define $\beta_0 = (i_t^* + ad_i_{t-1}^* + bcd_i_{t-2}^*)$, and $\beta_1 = ad$ and $\beta_2 = bcd$. Then equation (12) can be written as:

$$i_t + \beta_1 i_{t-1} + \beta_2 i_{t-2} = \beta_0$$  \hspace{1cm} (13)

The general solution to the reduced form equation (13) has complementary and particular parts. The particular solution refers to the steady state and the complementary solution shows a dynamic adjustment towards that steady state when the interest rate is above or below its natural rate. It explains the dynamics. The convergence or divergence from the steady state depends on this part of the equation. The particular or steady state solution is easy. In steady state, interest rate equals the natural rate and is equal for each period, $i_t = i_{t+1} = i_{t+2} = \ldots = i_{t+n}$. Let us denote this steady state or natural rate value as:

$$\bar{i} = \frac{i_t^* + ad_i_{t-1}^* + bcd_i_{t-2}^*}{1 + \beta_1 + \beta_2}$$ \hspace{1cm} with flexible targets and

$$\bar{i} = \frac{i_t^* + ad_i_{t-1}^* + bcd_i_{t-2}^*}{1 + ad + bcd}$$ \hspace{1cm} with fixed targets  \hspace{1cm} (14)

Any perturbations from this natural rate should ultimately return to it due to forces of demand and supply in the financial markets.

Transition from the steady state is represented by a homogeneous solution:

$$i_t + \beta_1 i_{t-1} + \beta_2 i_{t-2} = 0$$  \hspace{1cm} (15)

Now the complementary solutions can have three different cases depending on the values of parameters $\beta_0$, and $\beta_1$ and $\beta_2$

(a) real and distinct root if $\beta_1^2 - 4\beta_2 > 0$

(b) real and equal roots case if $\beta_1^2 - 4\beta_2 = 0$

(c) complex roots case if $\beta_1^2 - 4\beta_2 < 0$. The general solutions of the model in these three different cases are:
\[ i_t = A_1 \lambda'_1 + A_2 \lambda'_2 + \bar{i} \]  
(16)

where \( A_1 \) and \( A_2 \) are arbitrary constants and \( \lambda'_1 \) and \( \lambda'_2 \) are the characteristic roots. In case (a) the value of \( \lambda'_1 = -\beta_1 + \sqrt{\beta_1^2 - 4\beta_2} \) and \( \lambda'_2 = -\beta_1 - \sqrt{\beta_1^2 - 4\beta_2} \).

Therefore the general solution (7) can be written as:

\[ i_t = A_1 \left( -\beta_1 + \sqrt{\beta_1^2 - 4\beta_2} \right) + A_2 \left( -\beta_1 - \sqrt{\beta_1^2 - 4\beta_2} \right) + \bar{i} \]  
(17)

More specifically using all the parameters of the model this turns to be

\[ i_t = A_1 \left( -ad + \sqrt{(ad)^2 - 4bcd} \right) + A_2 \left( ad - \sqrt{(ad)^2 - 4bcd} \right) + \bar{i} \]  
(18)

The definite solution requires values of constant terms \( A_1 \) and \( A_2 \), which can be obtained using the two initial conditions, \( i_0 \) and \( i_1 \). Values of \( a, b, c \) and \( d \) parameters can be obtained from an econometric estimation with proper use of the target interest rate. Other two cases were considered but not reported here.

### III. Data Set

First we use the macroeconomic time series data for the UK economy available from the Essex data archive. Here we present only the series for the retail price index, growth rate of the real GDP and the treasury bill rates which represent the whole varieties of interest rate from 1970:q2 to 1999:q4. Figure 1
This figure shows that fluctuations in the interest, inflations and the growth rates were more serious in 1980s than in 1990s but the UK economy has been stabilised towards its natural rate after 1995. Similar pattern can be obtained from analysis of the annual data on growth rates output, inflation and interest rates for Germany, France, Japan, UK and USA from 1978 to 2000 to study whether such rule existed during that period.
IV. Analysis of Results

We use above data set to test the interest rate determination model as outline in the previous section. The econometric counter parts of equations (1)- (3) outlined above also include identically and independently distributed random error terms.

\[ y_t - y_t^* = d(i_{t-1} - i_{t-1}^*) + \varepsilon_{1,t} \]  \hspace{1cm} (18)
\[ \pi_t - \pi_t^* = c(y_{t-1} - y_{t-1}^*) + \varepsilon_{2,t} \]  \hspace{1cm} (19)
\[ i_t = i_t^* + a(y_t - y_t^*) + b(\pi_t - \pi_t^*) + \varepsilon_{3,t} \]  \hspace{1cm} (20)

We use a recursive estimation and simultaneous equation method to estimate this model. In the recursive estimation method first we estimate the output gap as a function of the lagged interest rate, then inflation gap on the lagged output gap and finally the interest rate rule using the predicted values of the output gap and inflation gaps estimated from the above equations. Note however that there is simultaneity among these variables, output gap is influenced by the interest rate, and the inflation gap is determined by the output gap and then that is determined by the interest rate. Therefore application of the OLS in one single equation produces a biased result. A simultaneous equation method is required in order to eliminate this bias. This fact is evident from the estimation of these equations presented using the Shazam software.

Figure 2:

Interest Rate Determination Model: Actual and Predicted Series
First we estimate equations (9), (10) and (11) individually. Coefficient of the Phillips curve is significant and has the expected sign but the overall explanatory power of the estimated equation is very minimal. There is also evidence for a positive autocorrelation. Similarly coefficient of output gap on the interest rate differential and that of inflation gap on output gap have expected signs but they are not significant. Again Durbin Watson statistics shows an evidence for a positive autocorrelation. Therefore estimates obtained using a single equation method are not reliable.

Phillips’ Curve:

\[ U = 9.42 - 0.250 \text{ RPI} \]
\[ \text{t-ratios } (18.05) (18.05) \]
\[ \text{R-SQUARE } = 0.1588 \quad \text{DW } = 0.56 \]

Output and the interest rate
\[ y_t - y^*_t = -0.185 (i_{t-1} - i^*_t) \quad d > 0 \]  
(9)
\[ \text{t-ratio } (-1.54) \quad \text{R-SQUARE } = 0.0199 \]

Output and inflation
\[ \pi_t - \pi^*_t = 0.129 (y_{t-1} - y^*_{t-1}) \quad c > 0 \]
\[ \text{t-ratios } (0.982) \quad \text{R-SQUARE } = 0.0082 \]

\[ \text{DURBIN-WATSON } = 0.127 \]

Interest rate rule
\[ i_t = 9.25 + 2.70 (y_t - y^*_t) - 2.76 (\pi_t - \pi^*_t) \]
\[ \text{t-ratios } (32.0) (3.97) (-3.38) \]
\[ R^2 = 0.18 \quad \text{Durbin-Watson } = 0.2065 \]

Single equation method failed because of a simultaneity bias across equations. This problem is avoided when we use a simultaneous equation method either by using a reduced form second order difference equation (13) for estimation or a vector autoregressive model that takes account of simultaneity bias. All coefficients of the reduced form equation and the VAR model have expected signs. The first explains up to 62 percent of the overall variation and the second explains even more, 86 percent of the variation in the interest rate.
Estimation of the second order difference equation for the interest rate:

\[ i_t = 1.630 + 0.582i_{t-1} + 0.244i_{t-2} \]

\[ t\text{-ratios} \quad (2.71) \quad (6.42) \quad (6.69) \]

R-SQUARE = 0.62 DURBIN-WATSON = 2.0104

Simultaneous equation estimation: VAR method

Interest rate \[ i = 4.969(y - y^*) - 5.182(p - p^*) \]

\[ (7.74) \quad (-7.27) \]

Output gap: \[ y - y^* = 0.08i + 0.504(p - p^*) \]

\[ (7.75) \quad (5.21) \]

Inflation: \[ p - p^* = -0.071i + 0.421(y - y^*) \]

\[ (-7.27) \quad (5.21) \]

SYSTEM R-SQUARE = 0.8637

The result of the simultaneous equation model has better overall fit. Now the model explains about 86 percent of variation in the interest rate. The fit of the predicted and the actual interest rate is almost perfect as shown in the figures below.

Figure 3:

Interest Rate Determination Rule: A Simultaneous Equations Estimation
Now we estimate the interest rule model for five major industrial economies France, Germany, Japan, UK and USA using the annual data set on growth rates of output, inflation and interest rates obtained from the World Bank (2002). As before we follow three steps in applying this interest determination model to five major industrial economies. First we predict current output gap as a function of the actual interest rates in the previous period relative to a trend interest rate, and the current inflation gap as a function of output gap in the previous period. Secondly we use these predicted series of output and inflation gaps to estimate model generated interest rate for each period. Finally we compare the series of the actual interest rates to those predicted by the model. These model predictions track actual interest rates very well and divide the sources of changes in the interest rate into the real or supply side factors as represented by the output gap and the demand side factors as represented by the inflation gaps.

<table>
<thead>
<tr>
<th></th>
<th>Output gap</th>
<th>Inflation gap</th>
<th>Constant</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td>-6.641</td>
<td>0.670</td>
<td>5.900</td>
<td>0.766</td>
</tr>
<tr>
<td></td>
<td>(-14.778)</td>
<td>(1.341)</td>
<td>(1.341)</td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>-10.732</td>
<td>4.335</td>
<td>5.339</td>
<td>0.752</td>
</tr>
<tr>
<td></td>
<td>(-15.187)</td>
<td>(4.953)</td>
<td>(11.898)</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>-6.775</td>
<td>-1.794</td>
<td>-1.312</td>
<td>0.641</td>
</tr>
<tr>
<td></td>
<td>(-6.554)</td>
<td>(-7.061)</td>
<td>(-3.487)</td>
<td></td>
</tr>
<tr>
<td>UK</td>
<td>-2.941</td>
<td>1.006</td>
<td>7.416</td>
<td>0.574</td>
</tr>
<tr>
<td></td>
<td>(-5.885)</td>
<td>(2.848)</td>
<td>(10.203)</td>
<td></td>
</tr>
<tr>
<td>USA</td>
<td>-1.794</td>
<td>0.360</td>
<td>5.337</td>
<td>0.696</td>
</tr>
<tr>
<td></td>
<td>(-7.061)</td>
<td>(0.408)</td>
<td>(18.955)</td>
<td></td>
</tr>
</tbody>
</table>

Values in the parenthesis represent $t$-statistics.

Explanatory power of this model in analysing the behaviour of the interest rate in each economy is quite remarkable as shown by higher values of $R$-square statistics. Size of the coefficients of output gap vary substantially across these countries reflecting the link between the interest rate and growth rate of the economy. These output gap coefficients are significant for each of the above countries at one percent.
level of significance as shown by the t-statistics. These economies reduce interest rate whenever actual output growth rate is below the trend growth rate and increase it whenever the actual growth rate is above the trend growth rate in order to avoid inflationary consequences. There is dissimilarity, however, regarding the link between the interest rate and inflation gap among these countries both is terms of size of the coefficients and its significance. All countries except Japan have expected sign of the coefficient on the inflation gap but that is not significant for the US. Despite this the predictive power of each equation remarkably suggests for existence of interest rate rule among these economies during the study period.

We also study the interdependence in the interest rate determination rule among these five major economies treating them as one economy by pooling cross section and time series data for 1978-2000.

\[ i_t = 6.25 - 0.29(y_t - y_t^*) + 0.115(\pi_t - \pi_t^*) \]

\[ \begin{align*}
\text{t-ratios} & \quad (0.80) \quad (-3.30) \quad (1.33) \\
R^2 & = 0.43 \quad F = 5.5; \ N=100 
\end{align*} \]

Though both output gap and inflation gap has expected signs with regards to the interest rate these estimates suggest that when we consider these five economies as one global economy there is more concern for the real output fluctuation rather than for the control of the inflation rate. It suggests that taken as a whole these economies importance attached to the lower inflation is secondary to that given to the lower unemployment rate and higher rate of growth of output further confirming the results as reported in Domenech et. al. (2002).

Analysis of how the interest rate affects the whole economy requires more detailed specification of demand, production, portfolio allocation and trade structure of the monetary economy in line with Tobin (1969), Altig, Carlstrom and Lansing.
V. Conclusion

Evolution of natural rate of unemployment hypothesis, dynamic time inconsistency and credibility and policy co-ordination at the national and international level gave rise to prominence of the central bank independence and rule based monetary policy aimed to achieve pre-set inflation target in the major industrial economies. We have presented a simple model for interest determination and found its analytical solution using the second order difference technique and estimated this model using the time series data on treasury bills rate, growth rate of output and inflation rates for the UK economy and for five major industrial economies during the last three decades. We find an evidence for such an interest rule and the interest changes to have significant impacts on output, unemployment and inflation in our estimation. We also find that this model can better predict the actual interest rate when it is estimated using the simultaneous equation technique rather than only when it is estimated with a single equation technique.
References


