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THE EFFECT OF BASE RATE CHANGE ANNOUNCEMENTS ON INTEREST RATES

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Abstract

The determination of interest rates is empirically investigated for the UK economy. Particular attention is given to the institutional framework in the conduct of monetary policy. Specifically, we have reviewed the Bank of England's operations in the money markets and its indigenous peculiarities such as the presence of the discount houses. The institutional arrangements ensure that the discount rate changes have a powerful influence on interest rates, contrary to the tradition whereby the money supply and demand are the main mechanisms for determining interest rates.

1. Introduction

The question as to whether monetary policy can affect the real rate of interest has been extensively investigated on both sides of the Atlantic in the last few years. The theoretical debate is old enough as it encompasses one of the main differences between the Keynesians and monetarists, ie the constancy or otherwise of interest rates. Keynesians would support the view that monetary policy does affect the real rate of interest. This implies that interventionist demand management can be applied in order to affect investment and consequently output and employment (see Dornbusch 1976, p. 1161, Buiter and Miller 1981, p. 143).

On the other hand monetarists like Friedman (1970, p. 125) would claim that the real .interest rate is more or less constant as it is determined by real factors of thrift and productivity and thus unaffected by Monetary Policy. The new-classical school (Sargent, 1972, p. 74) tends to agree with the latter view as they show that output and employment are determined by the long run values which means by implication that the real interest rate is constant.

Empirical evidence concerning the question of the constancy of the real interest rate has been ambiguous in both the United States and the United Kingdom, for example, Fama (1975, p. 269) has shown that nominal rates fully adjust to expected inflation. He assumed that the real rate is constant. Mishkin (1981, p. 29) seems to indicate that Fama's result does not hold over longer time periods.

Studies of the response of short-term nominal rates to money announcements include those by Cornell (1982, p. 201, 1983a, p. 1, 1983b, p. 644), Grossman (1981, p. 409), Urich (1982, p. 73), Urich and Wachtel (1981, p. 1063, 1984, p. 1177), Engle and Frankel (1984, p. 31), Roley (1983, p. 344) and Hardouvelis (1984, p. 225). The empirical results consistently show that for the period after 1979, when the Federal Reserve changes its operating procedures for the conduct of monetary policy, short and long term interest rates tend to rise whenever the Federal Reserve Board announces an increase in the money supply greater than had previously been expected.

For the UK, Symons (1983, p. 250), Mill and Stephenson (1987, p. 331) and MacDonald and Torrance (1987, p. 508, 1988, p. 69) and Tessaromatis and Triantafillou (1992) tend to show that real interest rates do not remain constant.

Most of these studies try to examine the impact of monetary policy on interest rates or asset prices by concentrating on the money supply as the instrument of monetary policy.

Reichenstein (1987, p. 67) in his survey of empirical work on the impact of the money supply on interest rates indicates that the monetary authorities 'appear to have little control over month-to-month changes in (short-term) interest rates'. This view is contrary to that held by the financial markets which believe that the monetary authorities can and do affect the rates of interest through the base rate.

Traditionally monetary policy in the UK is conducted through the control of (short) interest rates (the Minimum Lending Rate until 1981 and the base rate since). Control and an annual target rate for M3 was announced in 1976 and was further emphasised by the Conservative government elected in 1979. With the introduction of the Medium Term Financial Strategy in 1980, M3 became the centrepiece of UK monetary policy. In the Budget of 1982, targets were introduced for Ml and PSL (Public Sector Liquidity). M3 targeting was abandoned in 1985 and the Chancellor and Treasury have since maintained an annual target for MO. Irrespective of the monetary aggregate chosen for targeting, the monetary authorities used the base rate as the sole instrument of monetary policy.

2. Discount Rate and Monetary Policy

The implications of discount rate changes for short and long-run monetary policy and their effects on movement interest rates have been studied for the US market by Baker and Meyer (1980, p. 43), Roley and Troll (1984, p. 27) and Smirlock and Yawitz (1985, p. 1141). The evidence suggest that, after the Federal Reserve changed its monetary control procedures in 1979, discount rate announcements had a significant effect on short and long term nominal rates.

An increase in base rates will be accompanied by a similar increase in current short-term interest rates. Long-term interest rates being an average of current and future short-term interest rates will also rise. According to the expectations theory of the term structure of interest rates, the long rate is a geometric average of the current short rate oRi and the expected future short rates E(1R1), E(2R1) etc. For an η-year long rate, and increase (decrease) of 1% in the current short rate (oRi) will increase (decrease) the long rate by approximately 1/n. However, a base rate increase could affect long term rates by more or less that 1/n, if such an increase conveys new information about either short or long term monetary policy objectives.

Roley and Troll (1984, p. 27) argue that if a discount rate increase is interpreted by the market to imply a change in short-run monetary policy, then current and future short rates will be affected and by implication long term rates will increase. If, however, the discount rate increase signifies a change in long-run monetary policy (ie long-term monetary tightening) long term inflation and therefore long term nominal rates will fall. Since their evidence suggests that both short and long term interest rates rise (by more than the expectations theory would suggest) they interpret their evidence as supportive of the hypothesis that discount rate changes imply changes in short run and not long run monetary policy.

Roley and Troll's conclusion is implicitly based on the assumption that the market believes in the Government's monetary policy (ie the monetary authorities have credibility with the market). Therefore discount rate changes are interpreted as a change in short-run monetary objectives which aims to correct the growth of money, in order to maintain the long run target path. However, if the monetary authorities lack credibility with the market because they are (or are perceived to be) unable to contain money growth within its own target band, discount rate changes might permanently alter the public's expectations about future money growth and inflation. In that scenario, current short and long rates will also change in the same direction.

If prices are sticky in the short run, an increase (decrease) in short term nominal interest rates will be entirely due to an increase (decrease) in short term real interest rates. If the expectations theory holds for real interest rates, the effect of a change in the current short term real rate on long term real interest rates will be in the same direction but smaller (an increase of 1% in the current short term real rae will be associated with an increase of approximately 1/n, where η is the number of periods, in the long term real rate).

To summarise, an increase (decrease) in base rates will affect increase (decrease) short term nominal interest rates and via the term structute long term nominal interest. A change in long rates by more (less) than the expectations theory suggests would imply an information effect ie that the market changed its perception about short and long run monetary policy. A significant response of long run forward interest rates and expected inflation will be consistent with the markets perception of a permanent change in long run monetary policy in a world where monetary authorities lack credibility with the market.

This paper examines the effect of the base rate change announcements on the term structure of UK nominal interest rates. The availability of an index-linked bond market in the UK provides the opportunity to study the effect of base rate changes on long term real interest rates and expected inflation.

In an informationally efficient capital market, the adjustment of interest rates due to information revealed by the base rate change announcement should be complete by the end of the announcement day. We test the speed of adjustment in interest rates by examining the response of interest rates one day after the announcement of a base rate change.

It has already been mentioned that monetary policy in the UK is conducted from the medium of interest rates. It is argued that the Bank of England is able to influence a whole spectrum of interest rates because the institutional framework of the financial sector in the UK encompasses a number of unique features which direct the conduct of monetary policy. In the nect section we briefly investigate the role played by the Bank of England and other financial institutions in the determination of monetary policy.

3. The Institutional Framework of Money Markets in the UK

The Bank of England, which is the central bank of the UK holds an important position within the financial system. The main functions of the Bank are firstly, to act as the Banker to the Government and the commercial banks, and

secondly, it manages the national debt and foreign exchange reserves. This means that the Bank takes part in the substantial daily monetary transfers in the normal course of business.

The Bank of England conducts its operations by intervening in three main markets: the money market; the government debt market; and the foreign exchange market. There are two important features in the Bank's intervention in these markets. Firstly, the operational deposits which concern the payments system and secondly, the discount houses. Operational deposits are non-interest bearing operational balances which are held at the Bank by the clearing banks. Discount houses are financial institutions that are involved in the creation of secondary markets for a whole range of short-term financial instruments such as Treasury and commercial bills.

Operational deposits are used in order to settle accounts between the Bank and the banking system and within the banking system itself. The Commercial Banks which are the holders of the operational deposits with the Bank of England aim at minimising their holdings as they bear no interest. In the London money market a facility does exist which enables large cheques to be settled on the same day, yet the clearing banks are uncertain of their net cash position with the Bank at any time. Although there is some scope for intra-day accommodation the most relevant option is the borrowing facility held by the discount houses which act as intermediaries between the Bank of England[2] and the rest of the banking system. There are eight discount houses which are unique to the UK and traditionally the Bank deals almost exclusively with the discount houses in providing liquidity to the market by purchasing bills or by direct loans secured by money market paper.

The discount houses hold expertise in assessing credit risks and they stand ready to buy and sell commercial bills from the banks. An additional feature in the Bank's market operations is that they have been almost exclusively conducted recently with eligible bank bills. These are commercial bills that are used to finance short-term transactions accepted by an eligible bank and bought by a discount house. The discount houses have an obligation to make an offer with respect to the price and the amount of those bills that they wish to purchase. The Bank of England can then respond and thus affect short term rates by its reaction to these offers. These eligible bills comprise Treasury bills, eligible local authority bills, and eligible commercial bank bills. On a daily basis, estimates are made of the banking systems requirement for central Bank money and of the surplus or shortage implied. In the case of a shortage, the Bank would announce its official discount rate at which it is prepared to provide funds to the discount

houses. The Bank would make its own rate effective by issuing Treasury Bills in excess of what is necessary by ensuring that the discount houses were always short of funds. The Bank would always aim at keeping the market slightly short of funds on a daily basis in order to maintain its control over interest rates, via the terms on which it offered to relieve the shortages that were deliberately created (Bank of England, 1988a, p. 391). This system has survived the Conservative Government's ambitions to move towards monetary base control and the reasons for this were over-funding and continuous liquidity pressures which were associated with maturing bills held by the Bank, leading to permanent shortage of funds, therefore necessitating the Bank's intervention in alleviating the shortages.

The Bank's position in the money market is decisive in influencing the very short term rates. However, it always aims to influence interest rates that are more longer term. The Bank has never restricted its intervention to the very short end of the maturity spectrum of bills and frequently intervenes in longer maturities.

Every market day the Bank forecasts the needs for operational deposits (Bank of England, 1988b, p. 530). At the same time, commercial banks and discount houses make forecasts of their own position. The Bank always knows whether the market is going to be short of operational deposits in the absence of intervention. Operational deposits relate to the position of the clearing banks but the Bank of England is the ultimate source of operational deposits in the system. In money market operations, the Bank of England deals only with the discount houses. Any shortage of operational deposits is ultimately reflected in the clearing bank transactions with the discount houses. The discount houses then, receive assistance from the bank in several ways and at various times during the day. The discount houses will only relieve the shortage of operational deposits of commercial banks at a rate of interest which is above the discount rate that the Bank of England will deal with them.

The Central Bank can influence the short term interest rates because it can determine precisely the volume of operational deposits through its market transactions. In general, there are four different ways that the Bank can affect market rates; first, by transactions which determine the volume of bankers' deposists. Secondly, by setting an administrative rate; thirdly, by persuasion through signals such as a change in the administered rate and fourthly, by affecting expectations of future rate. The difference between the above mentioned ways is more of degree than fundamental.

The Bank of England has never tried to operate monetary based control and has always preferred to deal with operational deposits (Llewellyn and Tew, 1988, p. 25, Llewellyn, 1990, p. 63). The Bank's influence on interest rates is not total and market rates can and do diverge sometimes significantly from the Bank's discount rate, but the Bank does have the power through arbitrage, moral persuasion and expectations, and also the technical capacity to determine short term interest rates.

4. Methodology and Data

The reaction of interest rates from the market close before the announcement of a base rate change to the market close of the announcement day is tested by estimating the following equation:

$$R_t = a + b(BR_t - BR_{t-1}) + u_t$$

R_t represents the Change in interest rates of various maturities from the market close of business day t-1 to the market close of business day t. $BR_t - BR_{t-1}$ denotes the change in base rates taking place during day t. In most of the cases the day over which the clearing banks announced a base rate change coincides with the day the Bank of England signalled through its rediscount policy that a change in rates is advisable.

The time period for this study is January 1982 to December 1988. During this period, there were sixty-three discount changes. Forty one of these changes were decreases and twenty two increases. The interest rate data consists of seven different maturities; one, three, six and twelve month interbank rate and yields to maturity on the 5, 15 and 25 year government bonds. The yields on the longer maturity gilts are from the Financial Times Fixed Interest statistics and represent yields to maturity on high coupon bonds. The real interest rate is measured as the real yield to maturity on the Financial Times Index Linked Bond Index assuming 5% inflation.

UK index linked bonds are not fully indexed to inflation in the sense that there is an eight month lag in indexation. Under the large adjustment procedure operating for UK index linked bonds, coupons and face value are adjusted with the inflation that prevailed eight months before the coupon and face value are paid. The lag in adjustments makes UK index linked bonds to a certain extent, dependent on expected inflation. Arak and Kreicher (1985, p. 399) show that UK index-linked bond prices are far more sensitive to changes in real interest rates

than expected inflation. Moreover, the longer the maturity the smaller the effect of different inflation assumptions to real yields to maturity.

A change in the term structure of interest rates in response to a base rate change may be due to a perceived change in both short and long run paths for money. According to the expectations theory of the term structure of interest rates, long term spot rates and weighted average of the current short term spot rate and the expected short term forward rates. Thus it is possible that long term rates, in part, are made up of short term rates. To test the possibility that not only the spot but also distant forward rates are affected by the base rate change, we also calculated the three and six months forward rates expected to prevail three and six months in the future and the four and ten years forward rates expected to prevail in one, five and fifteen years in the future respectively. The method used to calculate forward rates is similar to that suggested by Smirlock and Yawitz (1985, p. 1141) in their study of the effect of discount rate changes in US asset prices[3]. Finally, a measure of long term expected inflation is derived by subtracting the real yield to maturity from the nominal yield to maturity of the 25 year high coupon index.

5. Empirical Evidence

The results from the estimation of equation[1] are given in Table 1. The coefficients of response of nominal interest rates are positive and statistically different from zero and decrease as maturity increases. A 1% increase in base rates is associated with an increase of 0.51% of the one month rate at the short end of the maturity structure and an increase of 0.07% for the 25 year yield to maturity. Base rate change accounts for 77% of the variability in the one month interbank rate on the day the change is announced. The amount of variation in nominal interest rates due to base changes decreases with maturity accounting for 20% of the variation of the longer 25 year yield to maturity variability.

The positive and statistically significant reaction of forward rate changes indicates that not only short term and nearby forward rates are affected by the change, but also forward rates in the distant future. For example a 1% change in base rates is associated with a 0.05% change in ten years forward rates five and fifteen years in the future.

We have established so far that the entire term structure of nominal interest rates responds positively to a change in base rates. To test whether it is the real or the inflation component (or both) which changes as a result of the change in

base rates we look at the coefficient of response of the real yield to maturity and the proxy for inflation expectations. Both coefficients are positive and statistically significantly different from zero at the 95% level of significance. A 1% increase (decrease) in base rates is associated on average with an increase (decrease) of 0.02% in long term real interest rates and 0.04% in long term inflation. These are direct and strong evidence of both a real interest rate and expected inflation effect.

The post announcement effect of base rate changes is tested by examining the interest rate response coefficients on the day after the announcement. In an efficient market, where adjustment due to new information takes place instantaneously, these coefficients are expected not to be significantly different from zero. For interest rates with maturity less than a year, the coefficients are positive and statistically different from zero at the 5% level of significance. For longer maturities and expected inflation, the coefficients were not statistically significantly different from zero. The significant reaction of the long-term real interest rate on the post announcement day reflects, in our view, the lack of liquidity of the index-linked bond market rather than market inefficiency.

The positive coefficients for the post-announcement day for short-term interest rates suggests that the adjustments of rates is not complete on the announcement day but it continues for the day after. The total effect of a 1% increase in base rates (ie day one and two combined) is an increase of the 1-month, 3-month, 6-month and one year rates by 0.8%, 0.67%, 0.58% and 0.48% respectively. The delayed reaction of short-term interest rates to base rate change announcements is suggestive of market inefficiency.

6. Conclusion

The results of this paper suggest that the announcement of a base rate change affects the entire term structure of interest rates. A base rate increase is accompanied by an increase in short, long and forward interest rates.

The increase in short-term nominal interest rates is consistent with the hypothesis that the market interprets the base rate change as a change in short-run monetary policy. This hypothesis however, does not predict an effect on long term interest rates beyond that implied by the expectation theory. In fact, our evidence suggests that not only short term but also long term forward rates increase. We also find that the announcement of a base rate change has a positive and significant effect on long term inflationary expectations and long

term real interest rates. The response of long term forward rates and expected inflation is consistent with the hypothesis that the announcement of a base rate change, alters the market's perception of long run monetary policy. The positive response of long run expected inflation provides support to the hypothesis that monetary authorities lack credibility with market participants.

The significant response of long term real interest rates is more difficult to rationalise. Even if the change in short term interest rates was entirely due to a change in real interest rates, the magnitude of the estimated response coefficient of long term real interest rates is much higher than what we would expect from the expectations theory of the term structure of interest rates. For example, if expectations of future real interest rates beyond three months are unaffected by base rate announcements then the change in the real yield to maturity would be (1/100) times the 3-month response. Using our estimate of 0.67% for the 3-month rate (day 1 and day 2 combined) the response of the long term real rate should have been 0.0067%. The estimated response coefficient of the real yield to maturity of index-linked bonds (0.05%) implies that not only nearby but also distant future real forward rates are affected by the announcement. Perhaps base rate announcements convey information not only about the course of future long-run monetary policy but also information about the future demand for money.

In this paper we have stressed the institutional approach to the determination of interest rates in the UK as opposed to the money supply (Tessaromatis and Triantafillou, 1992). The preliminary results suggest various promising lines for research such as the discrimination between unexpected movements in interest rates from expected movements. The main influences of monetary policy in the UK, in effect the only one, is the authorities control over short term interest rates. This is achieved through announced changes of base rates and also through expectations of change in the rates as speculation in the asset markets will find a new equilibrium helped by the presence of the discount houses[4]. In the case of speculation an established equilibrium will be altered due to expectations about change and this will eventually force the administered rates to change.

Table 1

The effect of Base Rate Changes on Interest Rates and Inflation

$R_t = a + b\ (BR_t - BR_{t-1}) + u_t$

Nominal Interest Rates		a	b	R_{-2}	S.E
R_1	D1	0.09* (0.03)	0.51* (0.04)	0.77	0.21
	D2	0.07* (0.03)	0.29*(0.05)	0.41	0.26
	D1+D2	0.16* (0.04)	0.80*(0.06)	0.78	0.32
R_3	D1	0.07* (0.02)	0.43*(0.03)	0.74	0.19
	D2	0.07* (0.03)	0.25*(0.04)	0.33	0.26
	D1+D2	0.14* (0.04)	0.67*(0.06)	0.71	0.32
R_6	D1	0.05* (0.02)	0.38*(0.04)	0.66	0.21
	D2	0.06* (0.03)	0.19*(0.04)	0.27	0.23
	D1+D2	0.12* (0.04)	0.58*(0.05)	0.69	0.29
R_{12}	D1	0.02 (0.03)	0.33*(0.04)	0.59	0.21
	D2	0.05**(0.03)	0.15*(0.04)	0.20	0.22
	D1+D2	0.07* (0.04)	0.48*(0.05)	0.64	0.27
R_{60}	D1	0.05* (0.02)	0.16*(0.02)	0.43	0.14
	D2	0.01 (0.02)	0.03 (0.02)	0.03	0.12
	D1+D2	0.06* (0.02)	0.19*(0.03)	0.41	0.17
R_{180}	D1	0.01 (0.01)	0.09*(0.09)	0.27	0.11
	D2	0.01 (0.01)	0.02*(0.09)	0.01	0.08
	D1+D2	0.02 (0.02)	0.10*(0.02)	0.26	0.13
R_{300}	D1	0.00 (0.01)	0.07*(0.02)	0.20	0.10
	D2	0.01 (0.01)	0.01 (0.01)	-0.00	0.07
	D1+D2	0.02 (0.02)	0.08*(0.02)	0.20	0.12
$_3F_3$	D1	0.04 (0.04)	0.34*(0.05)	0.46	0.27
	D2	0.06**(0.03)	0.14*(0.04)	0.12	0.26
	D1+D2	0.10* (0.04)	0.48*(0.05)	0.61	0.29
$_6F_6$	D1	-0.01 (0.03)	0.27*(0.04)	0.38	0.26
	D2	0.04 (0.03)	0.11*(0.04)	0.08	0.26
	D1+D2	0.02 (0.04)	0.39*(0.05)	0.49	0.29
$_{12}F_{48}$	D1	0.05* (0.02)	0.12*(0.03)	0.24	0.15
	D2	-0.00 (0.01)	0.01 (0.02)	-0.01	0.13
	D1+D2	0.05* (0.02)	0.12*(0.03)	0.20	0.18
$_{60}F_{120}$	D1	-0.01 (0.02)	0.05*(0.02)	0.07	0.13
	D2	0.01 (0.01)	0.01 (0.01)	-0.01	0.09
	D1+D2	0.01 (0.02)	0.06*(0.02)	0.09	0.13

Table 1 (continue)

The effect of Base Rate Changes on Interest Rates and Inflation

$_{180}F_{120}$	D1	-0.01	(0.02)	0.05*(0.02)	0.07	0.11
	D2	0.03*	(0.01)	0.01 (0.02)	-0.01	0.09
	D1±D2	0.02	(0.02)	0.05*(0.02)	0.06	0.14
Real Interest Rate						
	D1	0.00	(0.00)	0.02*(0.01)	0.14	0.04
	D2	0.00	(0.00)	0.01*(0.05)	0.05	0.05
	D1+D2	0.01	(0.01)	0.04*(0.01)	0.18	0.06
Expected Inflation						
	D1	0.00	(0.01)	0.04*(0.02)	0.09	0.10
	D2	0.01	(0.01)	0.01 (0.01)	-0.01	0.07
	D1+D2	0.01	(0.02)	0.05*(0.02)	0.07	0.13

* : Significant at the 5% level

** : Significant at the 10% level

Standard errors in parentheses

$_3F_3$: 3-months Ahead 3-month forward rate

$_6F_6$: 6-months ahead 6-months forward rate

$_{12}F_{48}$: 12-months ahead four year forward rate

$_{60}F_{120}$: 5-years ahead ten year forward rate

$_{180}F_{120}$: 15-years ahead ten year forward rate

Footnotes

1. Operational deposits consist of till money and bankers balances at the Bank excluding the half per cent mandatory cash ratio deposits, in short, free reserves.

2. Operations in the interbank market to alter cash in the system are technically possible but would involve a diminished role for the discount houses which the Bank does not favour.

3. The forward rate if obtained by the formula $_xR_y = ((x+y) / y) R_{x+y} - (x/y) R_x$ where R is the yield to maturity. The method provides a rough estimate of forward rates. A better approximation is suggested by Shiller, Campbell and Schoenholtz (1984, p. 27).

4. For analytical purposes we may consider the discount houses acting as a broker between the commercial and the central bank (the Bank of England). The discount houses obtain funds (called loans) from the banks and use these funds to purchase Treasury Bills. This is equivalent to the banks directly purchasing Treasury Bills.

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