

MONETARY POLICY IN THE UK

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Abstract

We argue in this contribution that the institutional dimension of the Bank of England monetary policy and the role the UK HM Treasury assumes in this framework are both firmly based on the New Consensus in Macroeconomics (NCM). This is also the theoretical framework upon which the Inflation Targeting element of monetary policy is firmly based. This paper discusses these aspects of the UK monetary policy, and then assesses the policy that has been pursued since 1997 (with some reference made to the period between 1992 and 1997 when a version of the framework was introduced). The strategy has been successful in terms of keeping UK inflation rates within the targets set by HM Treasury. However, a number of problematic issues are highlighted and discussed.

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1. Introduction*

The Monetary Policy Committee (MPC) of the independent Bank of England (BoE) operates and conducts monetary policy in the UK. The UK HM Treasury designs and sets the objective(s) and the inflation target of the UK monetary policy; it also appoints members of the MPC. In this framework, the BoE via the MPC decides on the instrument to be used to meet the objective(s) and the inflation target set by HM Treasury. The BoE, therefore, has instrumental independence but not policy goal independence. The aim of this paper is to investigate and assess the BoE's conduct and operation of monetary policy in the UK and the role of HM Treasury in the process. The pursuit of this particular policy, which has come to be known as Inflation Targeting (IT), covers the period since October 1992, when the BoE adopted the principle of IT, to today. The focus, however, is on the period since May 1997 when the Chancellor of the Exchequer gave independence to the BoE.

The paper begins with a discussion of the institutional dimension of the BoE monetary policy, and the role the UK HM Treasury assumes in this framework. This is followed by a short review of the theoretical framework upon which the IT policy element is firmly based. The rest of the paper attempts to assess the policy that has been pursued since 1992 with the modifications introduced in 1997. A number of problematic issues are highlighted. A final section summarises the argument and concludes.

2. The UK Monetary Policy Framework

In September 1992 the UK was forced out of the Exchange Rate Mechanism (ERM). In October 1992 the Chancellor of the Exchequer introduced some form of IT. The main features of that era, which were modified in 1997, were the following: 1%-4% inflation target; regular monthly monetary meetings between the Chancellor of the Exchequer and the Governor of the Bank of England to decide the level of the rate of interest; the BoE would give public advice to the Chancellor of the Exchequer, who was responsible to take the actual decisions on interest rates. In 1993 the inflation report was published for the first time, and in 1995 the publication of the minutes of the monthly monetary meetings, between the Chancellor and the Governor, was inaugurated. It is true to say that over that period there were disagreements between the Chancellor of the Exchequer and the Governor of the BoE, which affected adversely the credibility of the system in place (see Cobham, 2006, pp. F189-F190, for examples of those disagreements).

In May 1997 the new Chancellor of the Exchequer gave independence to the BoE, and assigned operational responsibility of monetary policy to the newly created Monetary Policy Committee (MPC). The MPC has a regular schedule of monthly meetings (comprising of a briefing meeting on the previous Friday, then a Wednesday afternoon discussion and a Thursday morning decision meeting), and also quarterly meetings on the forecasts and a drafting monthly-minutes meeting. There are also meetings to set research priorities, but these are not MPC meetings, though MPC members may attend.¹ The minutes of the meetings are released on the Wednesday of the week that follows the monthly meeting of the MPC. It is clear from the minutes of the MPC meetings that before policy decisions are reached, comprehensive

discussions take place on a number of issues, including “developments in financial markets; the international economy; money, credit, demand and output; and supply, costs and prices” (MPC, 2006b, for July). The membership of the MPC comprises of the Governor of the BoE and the two Deputy Governors; two BoE members (appointed by the Governor of the BoE in consultation with the Chancellor of the Exchequer); four external members, appointed by the Chancellor of the Exchequer; and there is also a Treasury Representative who attends and speaks but has no vote (this is an observer not a full member of the MPC). The internal members are permanent appointments, while the external members serve for a three-year period with the possibility of reappointment.

The main features of the new arrangements may be summarized: the primary objective of monetary policy is price stability and inflation is a monetary phenomenon. Price stability is achieved when inflation remains low and stable for a long period of time. In this monetary policy framework, public announcement of official inflation target is undertaken, thus the acronym ‘IT framework’. IT in the UK is conditioned on what inflation is expected to be rather than on what it is in view of the time lags in monetary policy. Subject to achieving and maintaining price stability in this way, the BoE is also expected to support the economic policy of the government, which includes growth and employment. Price stability is, thus, thought to be a precondition for high growth and employment. In the post-1997 system the MPC is accountable to Parliament.² Scrutiny is exercised through regular reports and evidence given to the House of Commons Treasury Select Committee, which also holds confirmation hearings for new MPC members. Scrutiny is also exercised through a House of Lords Select Committee on Economic Affairs. The MPC is also accountable to the public at large through the publication of the minutes of the MPC

meetings and the Inflation Report (see, for example, MPC, 2006a, letter of the Chancellor to the BoE Governor, annex to minutes for April).

The government, however, retains overall responsibility for monetary policy. It is responsible for designing the framework and it sets the inflation target. Once the inflation target is set, it becomes primarily a technical issue as to what level of interest rates is appropriate to meet the target. The MPC is responsible for setting the appropriate interest rate to meet the set inflation target by the Chancellor of the Exchequer. The BoE has, thus, instrument independence, but not goal independence, in its pursuit of monetary policy. In doing so, the BoE pursues the principle of 'constrained discretion', which is the middle ground between 'rules' and 'discretion' (Bernanke and Mishkin, 1997). Ever since 1992, but more so since 1997, enhanced responsibility of the BoE for its actions, accountability to the government and parliament, which implies transparency in actual policy making, are important attributes of the policy. Furthermore, the BoE is very concerned about openness, communication, and credibility. Individual reputation of MPC members is another important ingredient of the BoE monetary policy framework in view of the published minutes of each meeting of the MPC, which reveal individual voting.

In May 1997, the inflation target was changed to 2.5% with 1% tolerance range. The Retail Price Index (RPIX), excluding mortgage interest payments, was to be the new target. That was changed in December 2003 to the Harmonised Inflation Consumer Index (HICP) with 2% being the central target and with a 1% tolerance range (Brown, 2003).³ Defining IT within a range introduces a certain degree of flexibility in the conduct of monetary policy. Credibility attained through pre-commitment to the inflation target without government interference is thought to be paramount. The

inflation target is symmetrical, i.e. deviations below target are treated in the same way as deviations above the target. The symmetry of the target is underlined by the *open-letter procedure*. When inflation outcomes depart from the target by more than 1%, in *either direction*, the Governor of the BoE, on behalf of the MPC, is required to write an open letter to the Chancellor of the Exchequer, and explain (i) the reasons why the actual inflation rate is not within the prescribed target range; (ii) the policy action contemplated to deal with it and to bring actual inflation within the set range; (iii) the period in which inflation is expected to return to target; and (iv) how this approach meets the Government's objectives for growth and employment. An interesting feature of the open-letter procedure is that it recognises that there are circumstances, as for example in the case of temporary supply shocks, under which pursuit of the IT procedure, as normally expected, would be excessively costly in terms of real economic performance. A second letter should be sent after three months of the first letter if inflation remains 1% above or below target. It is clearly stated, though, that an open letter does not necessarily imply sign of failure.⁴

3. The Economics of UK Monetary Policy

The economics of the BoE's IT are firmly embedded in equations (1) to (6) as shown below. It is based on the 'The New Consensus Macroeconomics' (NCM) and here we present it when extended to an open economy as in Arestis (2007) – see, also, Agénor, 2002. This is clearly a typically simplified formulation of a more complex model utilised by the BoE in their monetary policy deliberations (Harrison et al., 2005). Although simplified, it delivers the gist of the theoretical framework from which current monetary policy is rooted. There are six equations in the model as follows.

$$\begin{aligned}
(1) \quad Y_t^g &= \alpha_0 + \alpha_1 \cdot Y_{t-1}^g + \alpha_2 \cdot E_t[Y_{t+1}^g] + \alpha_3 \cdot (R_t - E_t[p_{t+1}]) + \alpha_4 \cdot rer_t + s_1 \\
(2) \quad p_t &= \beta_1 \cdot Y_t^g + \beta_2 \cdot p_{t-1} + \beta_3 \cdot E_t[p_{t+1}] + \beta_4 \cdot (E_t[p_{w,t+1}] - E_t[\Delta er_t]) + s_2 \\
(3) \quad R_t &= (1 - \gamma_0) \cdot [RR^* + E_t[p_{t+1}]] + \gamma_1 \cdot Y_{t-1}^g + \gamma_2 (p_{t-1} - p^T) + \gamma_3 \cdot R_{t-1} + s_3 \\
(4) \quad rer_t &= \delta_0 + \delta_1 \cdot \{(R_t - E_t[p_{t+1}]) - (R_{w,t} - E_t[p_{w,t+1}])\} + \delta_2 \cdot CA_t + \delta_3 \cdot rer_t + s_4 \\
(5) \quad CA_t &= \eta_0 + \eta_1 \cdot rer_t + \eta_2 \cdot Y_t^g + \eta_3 \cdot Y_{w,t}^g + s_5 \\
(6) \quad er_t &= rer_t + P_{w,t} - P_t
\end{aligned}$$

with $\beta_2 + \beta_3 + \beta_4 = 1$; where α_0 is a constant that could reflect, inter alia, the fiscal stance, Y^g is the domestic output gap and Y_w^g is world output gap; R is the nominal rate of interest and R_w is the world nominal interest rate; p stands for the rate of inflation, p^w for the world inflation rate, and p^T for the inflation rate target; RR^* is the ‘equilibrium’ real rate of interest, that is the rate of interest consistent with zero output gap, which implies from *equation (2)* a constant rate of inflation; rer stands for the real exchange rate, and er for the nominal exchange rate, defined as in *equation (6)* and expressed as foreign currency units per domestic currency unit; P_w and P (in logarithms) are world and domestic price levels respectively, CA is the current account of the balance of payments, and s_i (with $i = 1, 2, 3, 4, 5$) represents stochastic shocks, and E_t refers to expectations held at time t . The change in the nominal exchange rate appearing in *equation (2)* can be derived from *equation (6)* as

$$\Delta er_t = \Delta rer_t + p_{w,t} - p_t.$$

Equation (1) is the aggregate demand equation that emanates from intertemporal optimization of a utility function that reflects optimal consumption smoothing. It is, thus, a forward-looking expectational IS relationship. The model allows for sticky prices in view of the lagged-adjustment elements in this relationship and in the

Phillips-curve relationship (the lagged price level in *equation (2)*), and full price flexibility in the long run. The real exchange rate affects the demand for imports and exports, and thereby the level of demand and economic activity. *Equation (2)* is a Phillips curve, with the term $E_t(p_{t+1})$ reflecting the focus of monetary policy on the expectations channel, which emphasises the forward-looking nature of expectations (King, 2005). *Equation (3)* is a monetary-policy rule, where the nominal interest rate responds symmetrically to inflation. Inflation above the set target leads to higher interest rates to contain inflation, whereas inflation below the target requires lower interest rates to stimulate the economy and increase inflation. The monetary policy rule in *equation (3)* embodies the notion of an equilibrium rate of interest, labelled as RR^* . When inflation is on target and output gap is zero, the actual real rate set by monetary policy rule is equal to this equilibrium rate.⁵ *Equation (4)* determines the exchange rate, while *equation (5)* determines the current account position. Finally, *equation (6)* expresses the nominal exchange rate in terms of the real exchange rate. There are six equations and six unknowns: output, interest rate, inflation, real exchange rate, current account, and nominal exchange rate defined as in (6).

We may now briefly summarise the main features of this framework, highlight its policy implications and explain how monetary policy is expected to operate. The policy aims are ultimate targets, rather than intermediate instruments. In this endeavour, policymakers are supposed to contribute to a clear understanding by the public of their policy intentions. Monetary policy is viewed as the main instrument of stabilisation policy, which should be operated only by experts in the form of the ‘independent’ BoE. Fiscal policy in this theoretical framework is downgraded, since it is no longer thought of as an effective stabilization instrument. Fiscal policy should only focus on medium to long-term objectives (Bean, 2007). Shocks to the level of

demand can be met by variations in the rate of interest to ensure that inflation does not develop, if unemployment falls below the NAIRU (non-accelerating inflation rate of unemployment).

Changes in the nominal rate of interest, as determined by the operating policy rule of the BoE, are associated with the real rate of interest changing in view of the sticky prices assumption. Changes in real interest rates affect consumption and investment, so that domestic aggregate demand is affected. Nominal interest rates can have further effects via credit and collateral effects, as well as via the normal wealth effects. In the case of open economies changes in the domestic real rate of interest influence the real exchange rate, with the latter affecting directly the prices of imported goods and the volume of exports and imports. Total aggregate demand, with aggregate supply given, along with the prices of imports, ultimately influences the targeted inflation. Changes in the rate of interest are thereby expected to affect the target inflation rate in the long run. No impact on real economic activity by changes in interest rates is hypothesised in the long run. Long-run real economic activity can only be affected via microeconomic policies to the extent that they can create flexible markets, especially so labour markets. The implication of this analysis is that monetary policy cannot have permanent effects on the level of economic activity. It can only have temporary effects, which persist for a number of periods in the short run before they completely dissipate in price adjustments.

We would ourselves, however, suggest that monetary policy *can* have long-run effects. This is especially so in view of theoretical and empirical results, which clearly show that to the extent monetary policy affects investment, and with the latter changing the size of capital stock in the process can have significant long-run effects

on NAIRU. In this view capital stock is a determinant of the rate of unemployment. The path of the economy is buffeted by shocks (whether from the demand side or the supply side), influencing the pace of capital accumulation and helping to determine the future capital stock and time path of the economy (Rowthorn, 1995; Arestis and Biefang-Frisancho Mariscal, 2000; Arestis et al., 2007). The theoretical debate about the relationships between capital shortage and unemployment focuses on the inelasticity of factor substitution between labour and capital (Bean, 1989; Jerger, 1991; Rowthorn, 1999). The empirical evidence focuses on countries that have experienced slowdown in capital accumulation per labour hour and have been faced with the highest unemployment rates; a number of studies have demonstrated (Dixon, 1998; Dow, 1998; Bean, 1989; Rowthorn, 1999; Fitoussi et al., 2000; Arestis and Biefang-Frisancho Mariscal, 2000; Miaouli, 2001; Malley and Moutos, 2001; Alexiou and Pitelis, 2003; Karanassou and Snower, 2004; Sawyer, 2004; Stockhammer, 2004; Stockhammer and Onaran, 2004; Arestis et al., 2007).

4. Assessing the UK Monetary Policy Framework

Figure 1 portrays a revealing picture of the IT episode so far in the UK. In this figure the actual inflation rate over the period (calculated as the annualized increase in RPIX to September 2003, the thick line; and as the annualized increase in HICP after October 2003, the dotted line) is shown. It is clear from this figure that the actual inflation rate has never failed to be within the tolerance range of the inflation targets imposed by the UK HM Treasury. These are depicted in Figure 1 by the continuous straight lines.

[FIGURE 1 HERE]

The point inflation targets are portrayed as the dotted lines in the same figure. The MPC has always enjoyed success in this sense. However, despite this apparent success, we suggest that there are a few problems with this particular way of conducting and implementing monetary policy. More precisely, we deal with the following problems in turn.

- Actual inflation has been systematically below the mid-point target, implying tight monetary policy;
- Insufficient attention paid to the exchange rate;
- Price stability is not enough: past experience is replete with examples of price stability followed by economic and financial crises;
- Countries that do not pursue IT type of policies have done as well as the UK;
- MPC membership problems.

We begin with the first problem to which we have just alluded.

4.1 Actual inflation below the mid-point target, implying tight monetary policy

Figure 1 is again relevant here. Inflation had been falling well before 1992; in fact, IT was implemented only after inflation had been tamed. One may also make the point that over the period since 1992 the economic climate in the UK, and elsewhere, has been very calm; it has actually been described as the ‘NICE’ (Non-Inflationary, Continuous Expansion) period (King, 2003, p. 3). In fact, after a peak reached in 1990, the RPIX inflation rate dropped to annualized magnitudes of 4% and falling,

just before IT was introduced. Thereafter, inflation records would never cross the upper bound imposed by HM Treasury in 1992 and subsequently in 1997 and 2003.

However, a closer look into the experience with IT reveals an interesting problem. To begin with, one may note that a very different pattern is observed between the periods before and after ‘independence’ was given to the BoE. As Figure 1 reveals, during the first stage (1992-1997) the actual rate of inflation tended to be above the mid-point of the 1%-4% range. Ever since the BoE was granted ‘independence’ in 1997, the same occurred only during very short periods of time. Most of the time during the latter period actual inflation has been nearer to the lower bound, clearly implying that monetary policy has been relatively tight, in any case tighter than the previous 1992-1997 era. To the extent monetary policy can have real effects, domestic or via the exchange rate (see below), this suggests that interest rates in the UK may have been unnecessarily higher than they might have been in the circumstances of the period under scrutiny.⁶

4.2 Insufficient attention paid to the exchange rate

A further problem with the BoE monetary policy analysis has to do with the exchange rate, which may not be given sufficient attention. It is actually clear from equation (3) that the BoE does not consider exchange rate considerations to play any direct role in the setting of interest rates. And yet the interest rate parity theorem indicates that the difference between the domestic interest rate and the foreign interest rate will be equal to the (expected) rate of change of the exchange rate. A relatively high (low) domestic interest rate would then be associated with expectations of a depreciating (appreciating) currency. Although the uncovered interest rate parity result often

appears not to hold empirically, it could still be expected that there is some relationship between domestic interest rates, relative to international rates, and movements in the exchange rate. Changes in domestic interest rates, relative to international interest rates and for given expectations, would affect the exchange rate, which can have significant effects on the real part of the economy. Furthermore, there may be indirect effects in so far as changes in the exchange rate influence expectations on future inflation. The exchange rate, therefore, could be an important channel through which the effects of interest rates may operate. It transmits part of the effects of changes in the policy instrument, and also the effects of various foreign shocks.

Given this potentially critical role of the exchange rate in the transmission process of monetary policy, excessive fluctuations in interest rates may lead to a relatively high degree of output volatility (Agénor, 2002). It is interesting to note in this context the conclusion reached by the UK House of Lords Select Committee on Economic Affairs (House of Lords, 2004a, 2004b) on this issue. The Committee refers to its “predecessor Committee” that “commented on the prominent role played in the United Kingdom by the exchange rate in the transmission of interest rates to inflation. They found that, according to the BoE economic model, in the first year 80% of the effect of an increase in interest rates is via an appreciation of the exchange rate” (House of Lords, 2004a, p. 26). In fact, between August 1996 and July 1997 the effective pound exchange rate appreciated by 23% putting a severe pressure on the manufacturing sector whose output fell in the following years. Manufacturing output actually fell between 1997 and 2002 after growing at 2% between 1992 and 1997.⁷ That level of the exchange rate has actually been sustained ever since. Since differences in inflation rates were not wide among developed countries, the real

exchange rate also went through a similar process of appreciation (see Figure 2). Despite this, the MPC considered at the time that intervention to influence the exchange rate would probably not have had the desired effect for the purposes of price stability.⁸ In the event high interest rates kept an appreciated exchange rate as shown in Figure 2 (where the official BoE interest rate is portrayed).

[FIGURE 2 HERE]

It has been argued (Wadhvani, 2000) that exchange rate misalignments should have a place in equation (3) above. The MPC's argument, as revealed by the minutes of the MPC meetings and Inflation Reports, is that the exchange rate might react erratically to such behaviour. Furthermore, such behaviour might confuse the markets and financial markets in particular, as to the role of the exchange rate in the reaction function, equation (3) above, thereby undermining MPC credibility and its objective of price stability. The adoption of IT, it is argued, leads to a more stable currency since it signals a clear commitment to price stability in a freely floating exchange rate system (see Cobham, 2006, for a detailed analysis and references to the relevant MPC minutes and Inflation Reports). This, of course, does not mean that monitoring exchange rate developments should not be undertaken. Indeed, weighting them into decisions on setting monetary policy instruments is common practice in the MPC proceedings (see, for example the minutes of the MPC meetings). Still, the monolithic domestic focus on inflation targeting, however, entails the real danger of "a combination of internal price stability and exchange rate instability" (Goodhart, 2005, p. 301). This occurrence is very real in view of the desire, especially by policy makers, to uphold domestic price stability at any cost.

It ought to be recognised, though, that there are real difficulties with these suggestions. These relate to the fact that the determinants and dynamics of exchange rate movements have proved nearly impossible to model satisfactorily. The theory, briefly summarised above (interest rate parity), indicates a close relationship between interest rate differentials and expected exchange rate movements, which would severely limit variations in interest rates. However, the model does not seem to work empirically. In fact, it is true to say that exchange rate variations have proved notoriously difficult to model empirically, regardless of the theoretical framework one might adopt. Despite the lack of consensus on the empirical determination of the exchange rate, we would still suggest that in view of the arguments advanced in this section, monetary policy should account more explicitly for the behaviour of the exchange rate. In this respect we would also suggest that more attention should be paid to the determinants of the exchange rate empirically.⁹

4.3 Price stability is not enough

The vigorous focus on price stability by the BoE raises the issue of whether such an objective is enough by itself.¹⁰ White (2006) argues that the pursuit of such an objective, which has reduced inflation from the earlier high levels, has actually produced benefits to the economies pursuing it. At the same time, though, achieving price stability in the short run might not be sufficient to avoid serious macroeconomic downturns in the medium term. History is replete with examples of periods of relative absence of inflationary pressures followed by major economic and financial crises. We cite only but a few instances in what follows to make the point. Perhaps the best case in this context is that of the US in the 1920s and 1930s. Most of the 1920s in the US were characterised by price stability with tendencies of deflation in the same

decade. There was technological innovation, rising productivity, strong investment and financial innovations that led to plentiful consumer credit (Eichengreen and Mitchener, 2003). All that turned into the 1930s Great Depression in the US. Massive decreases in output and employment, cumulative deflation along with financial distress, were the main characteristics. As Samuelson (1993) reports “Between 1930 and 1939 U.S. unemployment averaged 18.2%. The economy's output of goods and services (gross national product) declined 30% between 1929 and 1933 and recovered to the 1929 level only in 1939. Prices of almost everything (farm products, raw materials, industrial goods, stocks) fell dramatically. Farm prices, for instance, dropped 51% from 1929 to 1933” (p. 1).

A more recent example is Japan. The 1980s was a decade of price stability, with a yearly average inflation rate of 2.6%, following 6.7% in the last half of the previous decade. This period was also characterized by healthy investment rates with the financial sector enjoying technological innovation and deregulation. That, however, did not prevent the problems in Japan ever since the early 1990s. Growth per capita averaged only 1% annually in the 1990s, and after having oscillated around 2.5% during the decade of the 1980s, unemployment rose systematically during the early nineties evolving around 5% in the last year of the decade and thereafter. The banking sector witnessed a number of bankruptcies in spite of strong and sustained government intervention. The South East Asia crisis in the late 1990s is still another recent example. After the effects of the oil price and debt crisis passed by early in the 1980s, inflation in these countries was stable and below 10% (the Philippines was an exception in that inflation there peaked in two years, 1984 and 1991, above 10%). That period of relative stability was associated with healthy growth in credit investment and GDP over most of the period. However, this was not enough to

prevent the deep crisis in the summer of 1997, causing countries in the area to experience high costs in terms of GDP (with reductions mostly above 5%), thereby triggering rising unemployment, which in most countries continues to be high even nowadays.

Even more recently, the collapse of stock markets in the US and elsewhere in March 2001, had been preceded by price stability, along with a sharp increase in private investment associated with advances in productivity of the 'New Economy'. Here again, price stability was not sufficient to ensure high and sustained growth in economic activity. Interestingly enough, the post-2001 period in the US was characterised by unprecedented monetary and fiscal policy easing, which although managed to restore growth eventually, the pace of economic recovery was the slowest recorded in the post-second-world-war era. Yet another telling example is the Economic and Monetary Union (EMU) in Europe. Although the European Central Bank (ECB) does not pursue an inflation targeting policy (Duisenberg, 2003; Issing, 2003; see, also, footnote 9 below), it does, nonetheless, pursue a monetary policy strategy with "the clear commitment to the maintenance of price stability over the medium term" which "implies a stable nominal anchor to the economy in all circumstances" (ECB, 2001, p. 49). Admittedly the EMU as a block has done very poorly in terms of output growth and employment ever since its creation in January 1999, despite achieving price stability (around 2%). GDP in the EMU has grown at the disappointingly low rate of less than 2%, when the US GDP growth rate has exceeded 3%. In fact, not only is potential growth relatively low but also its actual growth performance is falling short of the low potential (see, for example, Padoa-Schioppa, 2005). There can hardly be clearer evidence of macroeconomic policy failure, despite focusing upon and achieving price stability.

The inevitable conclusion of this sub-section is that price stability does not necessarily guarantee benefits to the relevant economies. Consequently, the objective of price stability might have to be applied more flexibly, with a longer term time span, which would allow more emphasis on output stabilisation. We would suggest that price stability should be pursued in tandem with other objectives, especially so with output stabilisation.

4.4 Countries that do not pursue IT type of policies have done as well as the UK

Countries where central banks do not pursue the IT strategy have performed at least as well as the UK, where the BoE has a strong focus on the principles of IT.¹¹ In what follows in this sub-section we pursue this argument at some length, utilising the US as the country that does not pursue the IT strategy.¹² We begin by examining the adoption of IT in the UK, assessing whether significant changes in the stochastic mean of inflation performance follows the adoption of such strategy. For this purpose we apply intervention analysis to structural time series models (STM) following an approach first suggested by Harvey (1996).¹³

STMs decompose time series into unobserved components with specific and meaningful dynamic properties such as stochastic trends, seasonals and short-run shocks. Furthermore, it is possible to employ this methodology with the purpose of isolating such permanent and transitory changes to a series, from those happening due to specific events identified *a priori* by the researcher. The analysis of the impact of such incidents is known as intervention analysis (Box-Tiao, 1975).

UK and US inflation rates are integrated of order 1, i.e. I(1). In this case we apply the Local Level (LL) variant, which models variables distributed as ARIMA (0,1,1). As such they are I(1). In this case, the trend is allowed to fluctuate according to a simple random walk model. In what follows we represent the Local Linear model, sufficiently generalized to account for seasonal effects and the intervention, in our case the imposition of IT. The following two equations comprise the model.¹⁴

$$(7) \quad \pi_t = \mu_t + \gamma_t + \varepsilon_t$$

$$(8) \quad \mu_t = \mu_{t-1} + \delta \cdot \omega_t + \eta_t$$

In the *measurement equation* (7), π_t represents the inflation to be modelled. It is explained by the stochastic trend component (μ_t), by a seasonal component (γ_t), modelled in a stochastic trigonometric form, and a random shock (ε_t). The *level equation* (8) explains the stochastic trend (μ_t) which, as it was mentioned, follows a random walk and is influenced by random shocks, labelled as η_t . ω_t is the intervention variable, with δ thereby registering the impact of the policy intervention on inflation. In order to capture a shift in the underlying trend of the series, the intervention variable ω_t takes the value of 0 for the non-intervention time periods and 1 at the time the strategy is imposed. Both perturbations, ε_t , η_t and the ones corresponding to the seasonal component, are normally distributed with zero means and constant variance and covariance matrices.

STMs may be applied to only one relevant variable, as in the univariate models, or to a vector of variables, as in the case of multivariate STMs. The latter are particularly

relevant to IT since they “are shown to provide an ideal framework for carrying out intervention analysis with control groups” (Harvey, 1996). In the latter paper it is proved that estimation in the case of intervention is more efficient the higher the disturbances affecting the underlying trends, i.e. the higher η_t s are. In the current paper, intervention is used to capture the effects of the implementation of IT. For this purpose, following Harvey (1996), we employ a bivariate model, considering inflation rate series observed in the UK along with US inflation series, where IT has not been implemented; as such US is treated as the control group. In the *measurement equation* (7), therefore, π_t , has a dimension equal to 2, and it represents a vector composed of the inflation rates prevailing at time t in the UK, as the IT country, and also of the inflation rates at time t in the US, the non-IT case, used as the control group. Similarly, the rest of the components in (7) and (8) represent bivariate vectors, with elements corresponding to each country.

For the application, we use each country’s headline CPI, over the period 1956Q1 to 2006Q3.¹⁵ Reported results correspond to the episodes of IT imposition in the UK. First, in Model 1 we report results following intervention as imposed in the quarter when IT was first implemented, i.e. 1992Q4. Model 2 registers the effects of applying fully-fledged IT. That is, the intervention is considered when the BoE was granted ‘independence’ in 1997Q2. Finally, Model 3 refers to the effects of both key dates for IT in the UK.

Table 1 presents the main statistics used to assess the three models – we explain the statistics utilised in the Appendix. As all of the statistics are quite similar in the three treated models, we will discuss them in general. Heteroscedasticity is not a problem in

any of both countries at the 1% significance level.¹⁶ The Durbin-Watson statistic leads us to reject the hypothesis of autocorrelation in all cases at the 1% of significance level. The statistic for seasonals rejects the absence of seasonal patterns in both series, so these components are included in our models. All R^2 s appear to be reasonable. The last column is informative of the correlation between disturbances in the level equation pertaining to both series. We concentrate on these correlations because the level is the unobserved component upon which we focus our analysis. At 0.79, gains in efficiency are obtained, due to the use of a multivariate model and also to the correlations, which are very high. There are no common trends, however, which can only occur when these correlations are equal to 1.

[TABLES 1 AND 2 HERE]

The estimated coefficients for the intervention parameter in the case of the UK, in the three applications as reported in Table 2,, are included in the fourth column under the label 'Coefficient', with the Root Mean Squared Errors (RMSE), t- and p-values in the following columns. The last column reports the RMSE obtained by running the models with univariate STM. All three cases have the common characteristic of being associated with insignificant intervention coefficients. In all models reported, the sign of the intervention coefficient is negative for the intervention applied in 1992Q4, but insignificant, while it is positive and insignificant for the intervention included to capture the effects of the independence of the BoE.

In Figure 3 we present the stochastic trends estimated for both countries involved in the analysis, along with the point of intervention, indicated with a vertical bar. As

expected, the estimated trend for the UK shows just a small change after the intervention, whichever model is selected for the analysis. This is especially noticeable when compared with the control group, which shows a smooth on-going trend at each point of intervention. Such comparison also exposes a pattern of convergence in the long run between the inflation-rate series corresponding to both countries. It should also be noted that the downward trend in the two countries commences in the early 1990s. In the UK, IT was introduced after inflation had been tamed. However, the conclusion that IT was totally ineffective may be too hasty in that IT implementation may have so affected inflation expectations that subsequent inflation levels were contained within the IT limits. Indeed, a number of authors (for example, Bernanke et al., 1999; Corbo et al., 2002; Petursson, 2004) have argued that IT was a great deal more successful in ‘locking-in’ low levels of inflation, rather than actually achieving lower inflation rates.

[FIGURE 3 HERE]

We explore further this suggestion by offering further tests for the possibility of ‘lock-in’ effects. We undertake this task with the help of Table 3 and Figure 4. In the left hand side of the latter, we plot actual and forecast values for both series considered in the analysis, alongside the corresponding confidence intervals for the forecasts. CUSUM standardized residual plots for each series are depicted on the right hand side of Figure 4, along with their corresponding confidence intervals. The latter plots are produced by utilising formula (9):

$$(9) \quad CUSUM(t) = \sum_{j=r+1}^t \tilde{v}_j$$

where (\tilde{v}_t) are one step-ahead predictions. First, STMs are estimated for the period prior to intervention ($t=1, \dots, \tau-1$). Then, one-step ahead predictions are undertaken for $t= \tau+1 \dots T$, and these are compared with the actual values of inflation. As a result of this procedure, we compute standardized one step-ahead prediction errors (\tilde{v}_t) , which are then used via equation (9) to produce Figure 4. This procedure enables us to examine the possibility of ‘lock-in’ effects. The CUSUM-t test is applied to each estimated model. The CUSUM-t test provides an assessment of the CUSUM plots. It is calculated as:

$$(10) \quad CUSUM - t = (T - \tau)^{-1/2} \cdot \sum_{j=\tau+1}^{T-\tau} \tilde{v}_j$$

and is distributed as a t-statistic with $(T-\tau)$ degrees of freedom. This t-statistic should be used when there is suspicion of possible ‘breakaways’ of a certain sign, that is, when the cumulative standard errors may potentially drift away with a systematic sign. In this case, the t-statistic is used to test whether, following the intervention, there is a consistent pattern that would suggest failure to control inflation at the level that the model would predict, should there have not been any change in the monetary strategy. If any systematic pattern of ‘breakaways’ were noticeable, this would be taken as evidence of absence of a ‘lock-in’ effect.

[TABLE 3 AND FIGURE 4 HERE]

For each model CUSUM-t statistics are calculated both for the UK and the control group. These statistics, as mentioned above, are distributed as $t_{T-\tau}$ and reported for the

UK in the second column of Table 3, and for the US in the next column. The number of degrees of freedom is reported in column 5. According to these statistics, in both models ‘breakaways’ are rejected in the case of both countries as they are well below the critical value at the 5% level of significance. In the case of the UK, none of the cases reported in Figure 4 do forecast values lie outside of the confidence interval, nor do the CUSUM plots show any significant drift, being always very close to 0. Similarly, in the US case, Cusum plots lie very closely to the axis indicating no changes, and do not show any observable increasing or decreasing pattern. However, observing the graphs on the left hand side of Figure 4, there is some evidence of instability in the US, for which case real values occasionally escape from the confidence interval; although the intervals for the US are narrower than the corresponding one in the UK. We are, therefore, able to derive two important conclusions on the basis of these results. The first is that IT has been a success story in ‘locking-in’ inflation rates and thus avoiding a ‘bounce-back’ in inflation. The second is that a similar conclusion is applicable in the case of the two countries included in the control group. This clearly indicates that it may very well be the case that the apparent success of the ‘lock-in’ effect on the levels may be due to other factors than IT intervention. We suggest below that globalisation may very well be such other explanation. It ought to be noted, though, that inflation rate in the US appears to be less stable than in the UK, especially during 2005.

4.4a What can explain low and stable inflation?

How can one, then, explain the relevant low and stable inflation achieved not merely in the UK but elsewhere too? In the 2006 Bank for International Settlements annual report (BIS, 2006) it is suggested that the recent low and stable inflation rates since

the mid-1980s may very well be due to the direct and indirect effects of globalisation. So much so that this on-going process of globalisation, the report suggests, may have enabled monetary policy to be less tight than otherwise in reaching its objective(s). The report offers five channels to explain how this phenomenon may have operated: (i) opening global markets in goods, services and factors, cheap imports and greater cross-border investment are claimed to have reduced the costs of taming and keeping low inflation rates, without necessitating deep recession and rising unemployment rates; (ii) the consequent competition may have removed country-specific constraints and enabled the smoothing of business cycles in the process; this, in turn, may have made Central Banks more focused on maintaining low inflation; (iii) through the outflow of capital, increased global competition may have also amplified the penalties imposed on countries judged to have unsound policies, thereby imposing more discipline on policy-makers; (iv) deflation might be less costly in this new environment, where more efficient global markets of goods and factor inputs prevail, with increased incentives to promote market flexibility; and (v) with globalisation bringing down inflation, the credibility of central bankers has been enhanced substantially, helping to align expectations in a reinforcing manner.¹⁷

The International Monetary Fund 2006 *World Economic Outlook* (IMF, 2006) not only concurs with this explanation but it also offers a sixth channel. According to this explanation globalization may have induced incentives to raise productivity (helped by information technology developments) through enhanced pressures to innovate, along with stronger price and non-price competition. As a result, world aggregate supply increases (and China has helped a great deal on this score) thereby putting downward pressure on world prices. Still another reason for lower inflation rates throughout the world may have been due to the popular and determined political

consensus that inflation must be tamed at any cost. Related to these explanations there are two further arguments. The first is that larger markets resulting from globalisation produce economies of scale and enhanced competition both of which lead to higher productivity and downward pressures on inflation (Venables, 2006). The second argument is that globalisation through greater competition weakens the power of domestic monopolies and labour unions, thereby flattening the long-run Phillips curve. This then implies more credibility and durable commitment to low inflation (Rogoff, 2006; see, also, Bean, 2006). Relevant discussion and empirical evidence is provided by Kohn (2006), who argues that while inflation is ultimately a monetary phenomenon, globalisation may have had a significant downward pressure on inflation. Especially so in view of the opening up of mainly China and India, where the low cost of production has caused a geographic shift of production toward these countries thereby increasing world aggregate supply. Kohn (op. cit.) reports rather mixed empirical results on the impact of globalisation on inflation. This leads to the conclusion that while globalisation has changed the dynamics of inflation determination, “huge gaps and puzzles remain But the evidence seems to suggest that to date the effects have been gradual and limited: a greater role for the direct and indirect effect of import prices; possibly some damping of unit labour costs, though less so for prices from this channel judging from high profit margins; and potentially a smaller effect of the domestic output gap and a greater effect of foreign output gaps, but here too the evidence is far from conclusive” (pp. 9-10).

4.5 MPC membership problems

A number of additional ingredients of the BoE monetary policy framework appear to be of some importance. These come under the headlines of: openness and

transparency, accountability, communication of the essentials of monetary policy, credibility, and reputation of the MPC members. It is generally accepted that the BoE conduct of monetary policy has been a model for the rest of central banks on all these aspects. One particular problem, however, which invites some comment, is the last aspect of the list just mentioned, namely the credibility and reputation of the members of the MPC committee. This aspect assumes particular significance in view of the fact that the published minutes (ever since 1995 as mentioned above) reveal the voting of the individual members at each meeting of the MPC. Although there does not appear to have been any serious problems on this front, the recent appointment of external members has invited some criticism. The seriousness of this criticism emanates from the fact that it has come from the Governor of the BoE in his remarks to the Treasury Select Committee on the 29th of June 2006. The Governor criticized the Chancellor of the Exchequer for ‘an unclear, informal and slow’ way of choosing new members of the BoE’s MPC members. The Governor contrasted the “clear arrangement for the setting of interest rates with areas where the institutional arrangements are not as clear, such as the appointment of the members of the committee”.¹⁸ He went further to express concern with the present system of appointing external MPC members, which is “very informal and seems to result in appointments made very much at the last minute. I can’t think of anyone who benefits from that”. The Governor was very clear that his concern was with “the timing. It’s not the people or how the process works in essence. It’s trying to find a mechanism for ensuring that decisions are taken in a timely way”.¹⁹

The Governor took that opportunity to highlight the paramount importance of these appointments. He suggested that there should be “some presumptive timetable” for “What matters is getting it right. But to do that I suspect does mean a slightly more

systematic process”, which “would be helpful”. It is, of course, natural that “there will always be vacancies when people leave unexpectedly, and it’s more important to take one’s time to get the appointment right than to rush into a replacement”. The implication is, of course, that the process of appointing the external members of the MPC is highly secretive and in the hands of the Chancellor of the Exchequer. Even more recently, a powerful House of Lords select committee on economic affairs raised concerns about the appointment to the MPC of its external members and suggested that “it appears that they lack prior expertise in monetary economics (House of Lords, 2006, p. 10). Indeed, the process is “shrouded in mystery” (p. 10) and that “Greater transparency in the selection of appointees is ... desirable” (p. 10). It would appear that the need for greater transparency in the process of MPC appointments could potentially become a serious issue. A further potential implication of his type of incident and remarks is that it may be a sign of rising tensions between the Governor of the BoE and the Chancellor of the Exchequer. If this were to be validated, it could potentially affect adversely the credibility of the policy framework. Such an occurrence would not be unrelated to the criticism of the process between 1992-1997 when loss of credibility occurred as a result of disagreements between the Governor of the BoE and the Chancellor of the Exchequer as noted above. This calls for reforms that would improve the appointments procedure. A more transparent procedure might be one whereby the HM Treasury consulted the Bank of England on the appointment of the external members. This might remove the kind of disagreements to which we have referred and when some loss of credibility may have occurred.²⁰

5. Summary and Conclusions

We have attempted to study and assess the BoE's conduct and operation of monetary policy in the UK and the role of HM Treasury in the process. The time period considered spans from October 1992, when the BoE adopted the principle of IT, including the changes introduced in May 1997 and since.

We have focused at the beginning of the paper on the institutional dimension of the BoE monetary policy, and highlighted the theoretical framework upon which the IT policy is based. The policy that has been pursued since 1992 has been assessed, and a number of problems have been identified. The strategy has been successful in terms of keeping UK inflation rates within the targets set by HM Treasury. Indeed, we have produced evidence that suggests that the policy has managed to 'lock-in' the UK inflation rate at low levels. But then US, a non-IT country has been as successful in this regard. Recent low inflation rates are the result of other forces, perhaps that of globalisation. We have asked whether the focus on price stability is sufficient to achieve economic stability, and questioned the de-emphasis of the role of the exchange rate in the IT regime. There is evidence that suggests monetary policy in the UK may have been too tight and there may be potentially problems with the process of appointing MPC members. Clearly, more thought should be channelled into the current framework of the UK monetary policy.

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Footnotes

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¹ The rate of interest set by the MPC is the official Bank rate, and is paid on reserves held by commercial banks with the BoE.

² The MPC operated on a *de facto* basis for a year. In June 1998 the assigned objectives and the *modus operandi* of the MPC to meet the government's inflation target were given a statutory basis in the Bank of England Act of 1998.

³ HICP has been developed by the European Union (EU) in order to allow for cross-country comparisons, and it is currently used by the ECB. The main difference

between the two price indices mentioned in the text, is that HICP excludes council taxes and other housing costs, which are included in the RPIX. Note, however, that mortgage interest payments, are excluded from both indices. Also, HICP is calculated using the geometric mean of prices involved, while the arithmetic mean is used for RPIX purposes. In general terms, HICP is expected to be lower than RPIX, largely because of the exclusion from HICP of council taxes and other housing costs, which are included in RPIX. Also, since the arithmetic mean is utilised to calculate RPIX, this can lead to a small upward bias known as ‘price bounce’ (Roe and Fenwick, 2004).

⁴ It is to be noted that at the time of writing (February, 2007), it has not been yet necessary to invoke the open-letter procedure.

⁵ There are real difficulties and uncertainties that relate to arriving at robust estimates of the monetary rules of the type summarised in equation (3). The empirical estimates of RR* in particular are very imprecise (Weber, 2006).

⁶ A referee has noted that since “The average undershoot of inflation, 1997-2006 (or any other period) was minuscule (about ¼%), and on most rules of thumb could have been prevented by interest rates ¼% lower. That is tiny, not enough to get excited about”. The point made here is not how much nearer to the lower bound actual inflation was, but that it was consistently nearer to the lower bound, and thus monetary policy may have been relatively tight.

⁷ Output in the service sector grew by 3.6% in both periods (Cobham, 2006, p. F205).

⁸ The strategy followed by the MPC of keeping interest rates high in view of expected currency depreciation has been criticized by Allsopp, Kara and Nelson (2006); see, also, Kirsanova, Leith and Wren-Lewis (2006).

⁹ Similar comments might be made in the case of asset prices, especially housing. Despite the contributions made, this is another area where a great deal more research is necessary (see, Arestis and Karakitsos, 2005, for a summary of the arguments). In view of this, the House of Lords (2006) select committee on economic affairs is correct in their recommendation that “the Bank undertake further research on the links between the interest rate and inflation via asset prices as we think this is a critical aspect of monetary policy under inflation targeting” (p. 11).

¹⁰ Price stability is defined as low inflation (around 2%). The implicit assumption in this definition is that deflation, where prices fall in aggregate, is not consistent with price stability.

¹¹ See, for example, Ball and Sheridan (2005). See, also, Angeriz and Arestis (2007) for a review of the relevant literature.

¹² As mentioned in the text, in the US, the Federal Reserve System (Fed) does not pursue the IT strategy. The current Fed mandate, set by law in 1977 and reaffirmed in 2000, is that it should pursue three objectives in its conduct of monetary policy: maximum employment, stable prices and moderate long-term interest rates. This is not an IT strategy. Notice that, on a more empirical view, inferences about the interventions are benefited with more efficient estimates since both countries present highly correlated disturbances in the *level* equation.

¹³ See, also, Angeriz and Arestis (2005a, 2005b) for applications in the case of a number of OECD countries that pursue the IT strategy.

¹⁴ For the more technical details of the technique utilised for the purposes of this section, see Harvey (1989, p. 31).

¹⁵ The source is Datastream.

¹⁶ Note that the critical region is on the left hand side of the F-distribution; the critical value at the 1% confidence level is 0.42.

¹⁷ Central banks are accused, however, that by keeping interest rates too low for too long have allowed asset prices to surge and global imbalances to reach problematic levels. Unlike the Federal Reserve System in the US, this does not appear to have been obviously so in the case of the BoE.

¹⁸ The comments reported in the text were prompted by the fact that the MPC was left with only seven members instead of the nine (the quorum is six members). That was caused by one resignation, one member had to be replaced normally, and another died during his term of office.

¹⁹ The appointment of one of the external members of the MPC in May 2006 took ten days from initial approach to job confirmation. This was a very short period indeed, apparently.

²⁰ Another relevant suggestion might be that “when they join the MPC, more members than at present have relevant experience in macro and monetary economics” (House of Lords, 2006, p. 11).

Table 1. Summary statistics for the models including intervention analysis

	Test statistics				Rs ²	Estimated standard error of disturbances						Correlations between disturbances in levels	
	H	DW	Seasonal Effects	p-values		Irregular (q-ratio)	Level (q-ratio)	Seasonal (q-ratio)	Irregular (q-ratio)	Level (q-ratio)	Seasonal (q-ratio)		
Model 1	UK	0.510	1.941	15.0	[0.00]	0.307	0.654	[1]	0.383	[0.586]	0.035	[0.054]	0.787
	US	1.542	2.009	35.9	[0.00]	0.410	0.430	[1]	0.216	[0.503]	0.021	[0.049]	
Model 2	UK	0.516	1.946	15.0	[0.00]	0.306	0.652	[1]	0.386	[0.593]	0.035	[0.054]	0.788
	US	1.539	2.008	35.9	[0.00]	0.411	0.430	[1]	0.216	[0.503]	0.021	[0.049]	
Model 3	UK	0.506	1.951	15.0	[0.00]	0.306	0.652	[1]	0.388	[0.595]	0.035	[0.054]	0.778
	US	1.545	2.013	35.9	[0.00]	0.412	0.430	[1]	0.216	[0.503]	0.021	[0.049]	

Table 2. Intervention Estimates

	Dates of Intervention	Multivariate estimates					Univariate RMSE
		Observations	Coefficient	RMSE	t-value	p-value	
Model 1	1992/Q4	202	-0.3600	0.609	-0.591	[0.555]	0.749
Model 2	1997/Q2	202	0.2867	0.611	0.469	[0.640]	0.751
Model 3	1992/Q4	202	-0.3646	0.617	-0.591	[0.555]	0.753
	1997/Q2	202	0.2937	0.609	0.476	[0.635]	0.753

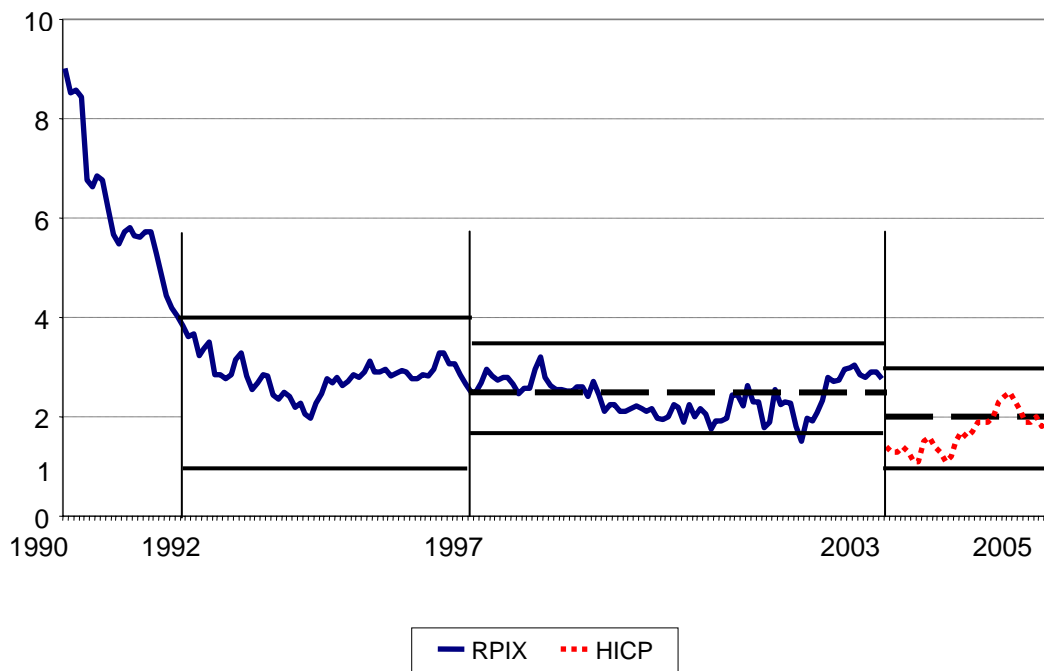
Note: All models are run with data up to 2004/Q4. When it is applicable, the restriction of common trends is imposed.

Table 3. Predictive capacity of models: CUSUM t-test

	UK	US	Degrees of freedom
Model 1	0.031	-0.051	55
Model 2	0.055	0.076	37

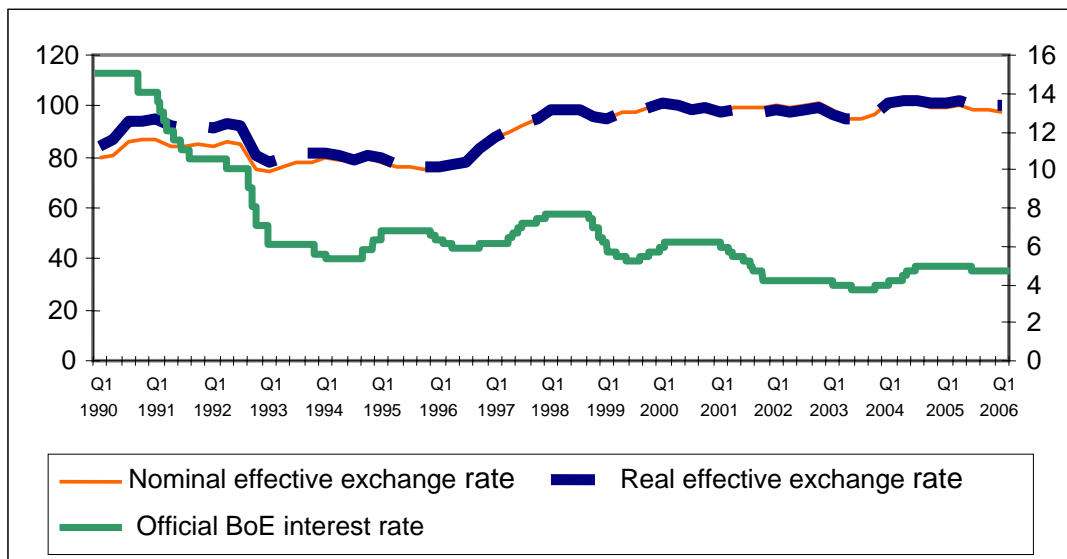
Note: The critical t-value is 1.96.

Figure 1. IT Regimes in the UK and Annual Rate of Inflation



Source: Office of National Statistics (2006).
Note: RPIX and HICP are in growth rates.

Figure 2. Effective Exchange Rates (Real and Nominal)



Source: DataStream (exchange rate, defined as foreign currency per unit of domestic currency) and BoE (interest rate, which is available on: <http://www.bankofengland.co.uk/statistics/rates/baserate.pdf>).
Note: See Lynch and Whitaker (2006) for more details on the definition and calculation of the effective exchange rate.

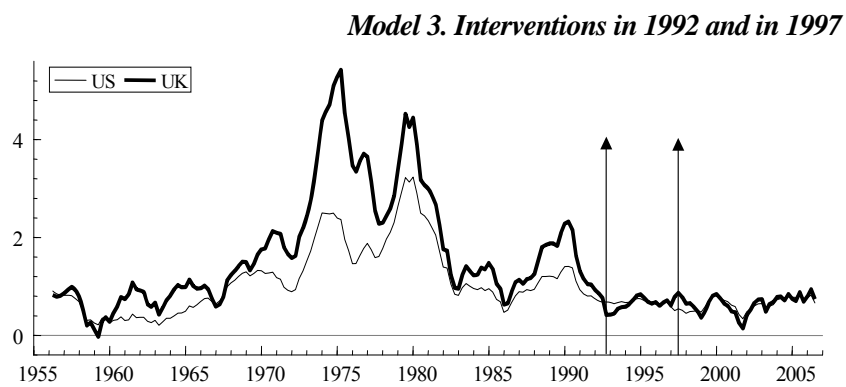
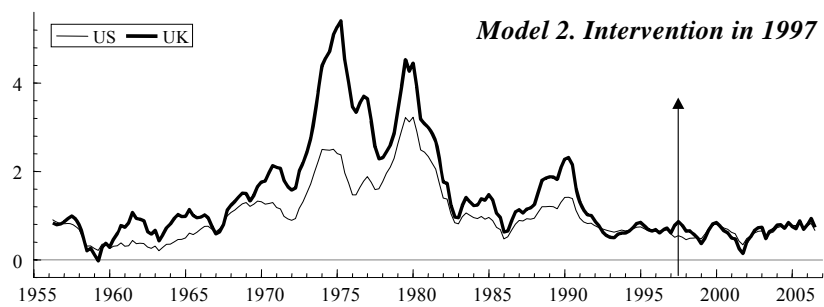
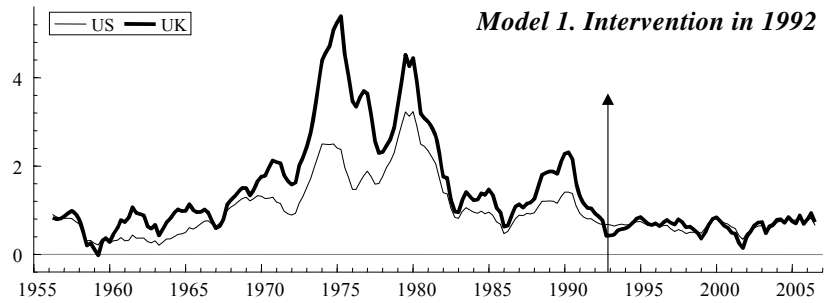
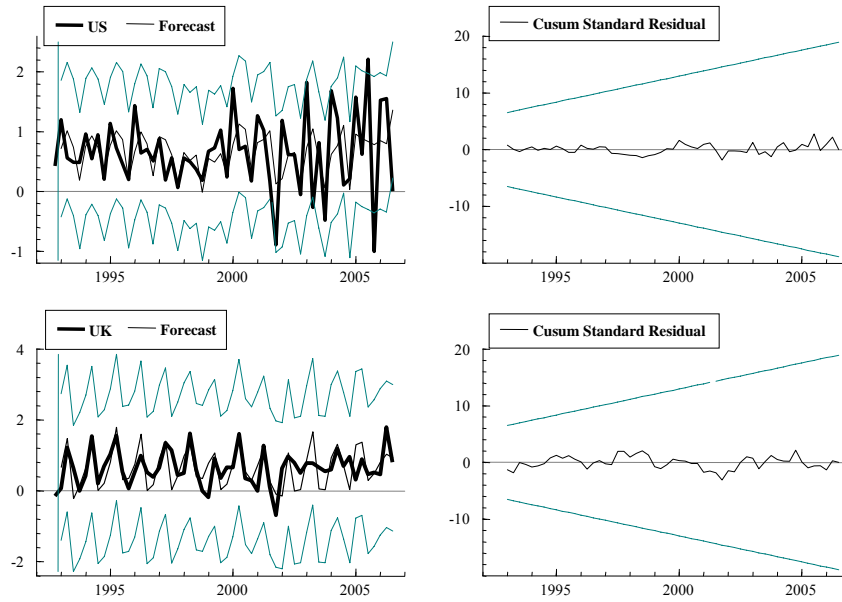
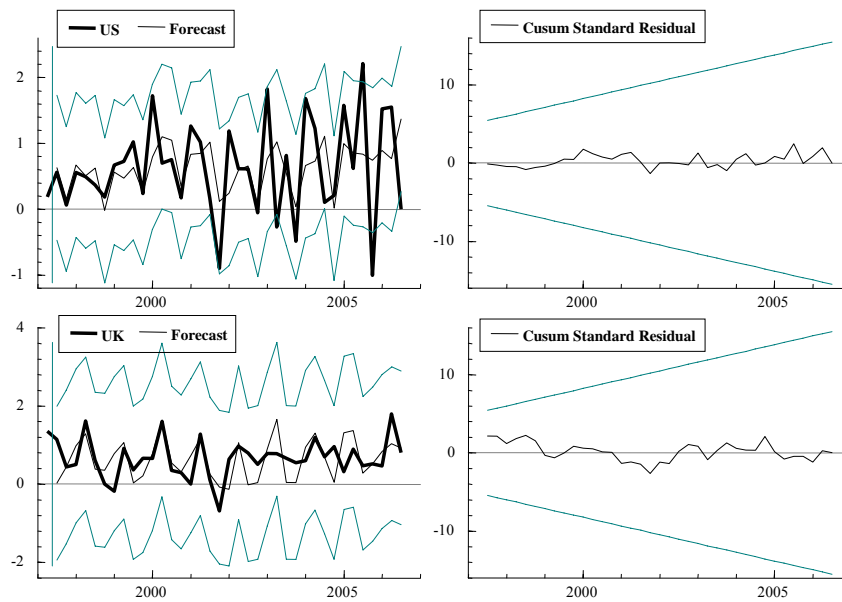
Figure 3. Trends in the UK and Control Group (%)

Figure 4. Inflation: Actual and Forecast Values (CUSUM function)

Model 1. Intervention in 1992Q4



Model 2. Intervention in 1997Q2



Appendix: Main statistics utilised in Table 1

The main summary statistics are presented in the first part of each country's reported table. The next three columns are devoted to present the correlations among the disturbances corresponding to UK and to the US. $H(h)$ is a test for heteroscedasticity, and it is distributed approximately as $F(h,h)$, where h is equal to one third of the number of observations minus the number of parameters; DW is the Durbin-Watson statistic, which, in a correctly specified model, is approximately distributed as $N(2, 4/T)$, where T is the number of observations. To test whether a seasonal cycle is present in the series we proceed as recommended in Harvey and Bussetti (2003), estimating the model including the relevant dummies and applying the χ^2 statistic with 3 degrees of freedom; the results are presented in the third column. R_s^2 is the coefficient of determination, calculated as $R_s^2 = 1 - [(T - d) \cdot \tilde{\sigma}^2 / SSDSM]$, where SSDSM stands for the sum of squared errors obtained by subtracting the seasonal mean from the dependent variable in differences (Koopman, et al., 1999). In the second part of each country's table, the estimated hyperparameters are reported. The mnemonics are as follows: 'Irregulars' are estimates of the variance of perturbations in the measurement equation ($\tilde{\sigma}_{\varepsilon_{it}}^2$); 'Level' corresponds to the variance of the disturbances driving levels ($\tilde{\sigma}_{\eta_{it}}^2$); and 'Seasonal' stands for the estimated variance of the seasonal disturbances ($\tilde{\sigma}_{\kappa_{it}}^2 = \tilde{\sigma}_{\kappa_{it}^*}^2$). q-ratios are calculated as the ratios between the standard deviation of each component and that of the corresponding irregular. Finally, correlations between the disturbances in the level equation are included.

CHAPTER 2: What is the New Consensus in Macroeconomics?

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1. Introduction

This paper begins by setting out the view, which is often labelled as New Consensus in Macroeconomics (NCM), but doing so in the context of an open economy. We also attempt to elaborate on what it is, and on some of the problems associated with it. At the outset, NCM is characterized by its emphasis on a number of factors, with the most important ones being the following. Inflation is a monetary phenomenon in that it is under the control of the monetary authority. Related to this characteristic is the elevation of monetary policy at the expense of fiscal policy. The supply-side determined equilibrium level of unemployment (the ‘natural rate’ or the non-accelerating inflation rate of unemployment, the NAIRU) is particularly relevant. Aggregate or effective demand and fiscal policy can only have a short-term impact on real variables, and do not influence NAIRU.

We extend the new consensus macroeconomic model to the case of an open economy. This enables some attention to be given to the exchange rate channel of the transmission mechanism of monetary policy in addition to the aggregate demand channel and the inflation expectations channel. In the context of this extended model of NCM a range of issues arise, which we examine in this contribution. The second main section of the paper considers the policy implications of the NCM and the use of monetary policy rules.

2. An open economy New Consensus Macroeconomics

The New Consensus Macroeconomics has generally been analysed in a closed economy context (see, for example, Meyer, 2001, McCallum, 2001, and our analysis of NCM, e.g. Arestis and Sawyer, 2003a). Here, we present our own interpretation of NCM when extended to an open economy (see, also, Agénor, 2002). The manner in which we extend the closed economy NCM model should be rather uncontroversial, and we do so in order to highlight some issues, which can easily be ignored when only a closed economy is concerned, specifically the links between interest rate, exchange rate and inflation.

We utilise a six-equation model as follows.

- (1) $Y_t^g = a_0 + a_1 Y_{t-1}^g + a_2 E_t(Y_{t+1}^g) + a_3 [R_t - E_t(p_{t+1})] + a_4 (rer)_t + s_1$
- (2) $p_t = b_1 Y_t^g + b_2 p_{t-1} + b_3 E_t(p_{t+1}) + b_4 [E_t(p_{wt+1}) - E_t(\Delta(er)_t)] + s_2$
- (3) $R_t = (1 - c_3)[RR^* + E_t(p_{t+1}) + c_1 Y_{t-1}^g + c_2 (p_{t-1} - p^T)] + c_3 R_{t-1} + s_3$
- (4) $(rer)_t = d_0 + d_1 [(R_t - E_t(p_{t+1})) - [(R_{wt}) - E(p_{wt+1})]] + d_2 (CA)_t + d_3 E(rer)_{t+1} + s_4$
- (5) $(CA)_t = e_0 + e_1 (rer)_t + e_2 Y_t^g + e_3 Y_{wt}^g + s_5$
- (6) $er_t = rer_t + P_{wt} - P_t$

with $b_2 + b_3 + b_4 = 1$; where a_0 is a constant that could reflect, inter alia, the fiscal stance, Y^g is the domestic output gap and Y_w^g is world output gap, R is nominal rate of interest (and R_w

is the world nominal interest rate), p is rate of inflation (and p^w is the world inflation rate), p^T is inflation rate target, RR^* is the ‘equilibrium’ real rate of interest, that is the rate of interest consistent with zero output gap, which implies from equation (2) a constant rate of inflation; (rer) stands for the real exchange rate, and (er) for the nominal exchange rate, defined as in equation (6) and expressed as foreign currency units per domestic currency unit, P_w and P (in logarithms) are world and domestic price levels respectively, CA is the current account of the balance of payments, and s_i (with $i = 1, 2, 3, 4, 5$) represents stochastic shocks, and E_t refers to expectations held at time t . The change in the nominal exchange rate appearing in equation 2 can be derived from equation 6 as $\Delta er = \Delta rer + p_{wt} - p_t$.

Equation (1) is the aggregate demand equation with the current output gap determined by past and expected future output gap, the real rate of interest and the real exchange rate (through effects of demand for exports and imports). Equation (2) is a Phillips curve with inflation based on current output gap, past and future inflation, expected changes in the nominal exchange rate, and expected world prices (and the latter pointing towards imported inflation). Equation (3) is a monetary-policy rule (defined by, for example, Svensson, 2003, p. 448, amongst others, as a ‘prescribed guide for monetary-policy conduct’). In this equation, the nominal interest rate is based on expected inflation, output gap, deviation of inflation from target (or ‘inflation gap’), and the ‘equilibrium’ real rate of interest. The lagged interest rate (often ignored in the literature) represents interest rate ‘smoothing’ undertaken by the monetary authorities (see, for example, Rotemberg and Woodford, 1997; Woodford, 1999; Clarida, Galí and Gertler, 1998, 2000). This equation can be regarded as replacing the LM curve, which incorporated a monetary policy rule (fixed money supply) with equality between demand for and supply of money. Equation (4) determines the exchange rate as a function of the real interest rate differentials, current account position, and expectations of future exchange rates (through domestic factors such as risk premiums, domestic public debt, the degree of credibility of the inflation target, etc.). Equation (5) determines the current account position as a function of the real exchange rate, domestic and world output gaps; and equation (6), which expresses the nominal exchange rate in terms of the real exchange rate. There are six equations and six unknowns: output, interest rate, inflation, real exchange rate, current account, and nominal exchange rate defined as in (6).

A seventh equation relating the stock of money to ‘demand for money variables’ such as income, prices and the rate of interest could be added, which would reinforce the endogenous money nature of this approach with the stock of money being demand determined. Clearly, though, such an equation adds nothing to the operation of the model in that the stock of money thereby determined is akin to a residual and does not feed back to affect other variables in the model.¹ The absence of any form of LM relationship based on the equality of the demand for and supply of money entails two important implications. The first is that the stock of money is treated as a ‘residual’ in the sense that the stock of money has no causal significance within the approach (e.g. changes in stock of money do not cause inflation) and the rate of interest is treated as set by the Central Bank and is not market determined.² King (2002) notes that “as price stability has become recognised as the central objective of central banks, the attention actually paid to money stock by central banks has declined”. Surprisingly perhaps, “as central banks became more and more focused on achieving price stability, less

¹ We have explored this issue and others related to whether the stock of money retains any causal significance at some length in Arestis and Sawyer (2003a).

² Romer (2000) justifies the absence of an LM in the NCM model on the basis of policy changes. The change is from attention paid to monetary aggregates in the past, to one where central banks now follow a real interest rate rule-based policy.

and less attention was paid to movements in money. Indeed, the decline of interest in money appeared to go hand in hand with success in maintaining low and stable inflation” (p. 162; see, also, King, 2004a). The second implication is that since money is a residual, it is endogenously created by the banking system during the process of loan creation, and the stock of money is essentially determined by the demand for money. Any notion of ‘excess’ money has no role to play.

This model has a number of additional, and relevant, characteristics. Equation (1) resembles the traditional IS function, but they differ substantially. The original IS/LM curve represents demand and supply for goods and services. The NCM IS curve emanates from intertemporal optimisation of a utility function that reflects optimal consumption smoothing. It is, thus, a forward-looking expectational IS relationship.³ There are both lagged adjustment and forward-looking elements; the model allows for sticky prices (the lagged price level in the Phillips-curve relationship) and full price flexibility in the long run. The real exchange rate affects the demand for imports and exports, and thereby the level of demand and economic activity. The term $E_t(p_{t+1})$ in equation (2) can be seen to reflect central bank credibility. If a central bank can credibly signal its intention to achieve and maintain low inflation, then expectations of inflation will be lowered and this term indicates that it may be possible to reduce current inflation at a significantly lower cost in terms of output than otherwise. In this way monetary policy operates through the expectations channel referred to in the introduction. In fact in the case of the UK it has been argued (King, 2005, in particular) that “monetary policy was able to respond by less than would otherwise have been necessary because it affected expectations”, and that “the real influence of monetary policy is less the effect of any individual monthly decision on interest rates and more the ability of the framework of policy to condition expectations. The precise ‘rule’, which central banks follow is less important than their ability to condition expectations” (p. 7). There are two important effects incorporated in this relationship that emanate from the exchange rate variable. There is a direct exchange rate channel via the impact of the prices of imported goods and services on domestic consumer prices (wages may also be affected by actual or expected consumer prices caused by exchange rate changes). There is also an indirect mechanism on price inflation, emanating from the cost of production, which may be affected via the prices of imported intermediate inputs.⁴

Equation (3), the operating rule, implies that ‘policy’ becomes a systematic adjustment to economic developments in a predictable manner. It stipulates that the nominal rate of interest is the sum of the real interest rate and expected inflation. As such, it may incorporate a symmetric approach to Inflation Targeting (IT). Inflation above the target leads to higher interest rates to contain inflation, whereas inflation below the target requires lower interest rates to stimulate the economy and increase inflation. Equation (3) contains a stochastic shock element, implying that monetary policy operates with random shocks; this is not always the case in the literature, where in some cases this element is not incorporated in equation (3) – see, for example, McCallum, 2001). In the tradition of Taylor rules, the exchange rate is assumed to play no role in the setting of interest rates (except in so far as

³ There are further differences between the old consensus IS/LM model and the NCM. Three have been highlighted (Meyer, 2001): the old IS/LM framework contained three unknowns (Y, M and P), with P assumed given to close the system. In the NCM framework a Phillips curve relationship determines P, so that there are three unknowns in three equations. The LM curve in the old IS/LM is replaced by a monetary rule relationship for the rate of interest. Unlike the old IS/LM framework, NCM incorporates forward-looking expectations.

⁴ See, for example, Agénor (2002) and Agénor and Montiel (1999, ch.8) for more details on the channels of influence of exchange rate changes.

changes in the exchange rate have an effect on the rate of inflation which clearly would feed into the interest rate rule). The neutrality of money property is assumed, so that doubling the stock of money would have no effect whatsoever; consequently, the stock of money is merely a 'residual' in this model.

Four further characteristics complete the list. The first is that the level of economic activity fluctuates around a supply-side equilibrium, where the supply-side equilibrium is unaffected by the path of aggregate demand. In the model outlined above this equilibrium corresponds to $Y^g = 0$ (and inflation is equal to target rate, and real interest rate is equal to RR^*). This can be alternatively expressed in terms of the non-accelerating inflation rate of unemployment (the NAIRU) such that unemployment below (above) the NAIRU would lead to higher (lower) rates of inflation. The NAIRU is a supply-side phenomenon closely related to the workings of the labour market. The source of domestic inflation (relative to the expected rate of inflation) is seen to arise from unemployment falling below the NAIRU, and inflation is postulated to accelerate if unemployment is held below the NAIRU. However, in the long run there is no trade-off between inflation and unemployment, and the economy has to operate (on average) at the NAIRU if accelerating inflation is to be avoided. In the long run, inflation is viewed as a monetary phenomenon in that the pace of inflation is aligned with the rate of interest. The Governor of the Bank of England summarises the argument very aptly, "Monetary policy determines inflation and the supply capacity of the economy determines the rate of growth" (King, 2004b, p. 1). The control of the money supply is no longer considered as an instrument of monetary policy, essentially for two reasons: the first is that monetary control may not be possible because money supply cannot be controlled. The second is because for monetary targeting to have predictable effects on inflation, it requires a stable demand for money. Possible instability of the demand for money, makes the impact of changes in the money supply a highly uncertain channel of influence. Clearly, monetary targeting requires adequate knowledge of the parameters that underpin the demand for money. These parameters, especially the interest rate elasticity of the demand for money, may be highly unstable so that the information content of money for future inflation would be very low. Money, then, ceases to be a good predictor of future inflation. Indeed, it has been argued (Clarida, Galí and Gertler, 1999) that monetary targeting is associated with greater inflation variability than inflation targeting, and with greater variability in output for it induces higher volatility in interest rates.

The second is that the essence of Say's Law holds, namely that the level of effective demand does not play an independent role in the long-run determination of the level of economic activity, and adjusts to underpin the supply-side determined level of economic activity (which itself corresponds to the NAIRU). The adjustment of demand to the supply-side equilibrium is effected by interest rate decisions whereby the 'equilibrium interest rate' is the rate, which equates demand and supply. However, it should be noted that the adjustment process is an administrative one operated by the Central Bank in the setting of interest rate. Shocks to the level of demand can be met by variations in the rate of interest to ensure that inflation does not develop (if unemployment falls below the NAIRU). The implication of this analysis is that there is a serious limit on monetary policy. This is that monetary policy cannot have permanent effects on the level of economic activity; it can only have temporary effects, which are serially correlated. This implies further that a change in monetary stance would have temporary effects, which will persist for a number of periods before they completely dissipate in price adjustments.

The third is that exchange rate considerations are postulated (as in equation 3) not to play any direct role in the setting of interest rates by the Central Bank. There may be indirect effects in so far as changes in the exchange rate influence expectations on future inflation. The exchange rate is though an important channel through which the effects of interest rates may operate. It transmits both certain effects of changes in the policy instrument, interest rates, and various foreign shocks. Given this critical role of the exchange rate in the transmission process of monetary policy, excessive fluctuations in interest rates may lead to a relatively high degree of output volatility (Agénor, 2002). It is interesting to note in this context the conclusion reached by the UK Lords Select Committee on Economic Affairs (House of Lords, 2004a, 2004b) on this issue. The Committee refers to its “predecessor Committee” that “commented on the prominent role played in the United Kingdom by the exchange rate in the transmission of interest rates to inflation. They found that, according to the Bank of England economic model, in the first year 80% of the effect of an increase in interest rates is via an appreciation of the exchange rate” (House of Lords, 2004a, p. 26). Under these conditions, large movements in the exchange rate can produce excessive fluctuations in output by inducing large changes in interest rates (Ball, 1999). Exchange rate targeting, however, is thought to be effective only when it is credible, and this depends to a large extent on domestic macroeconomic policies. In this respect IT is thought to operate better than exchange rate targeting. The argument is couched in terms of the experience of a number of developing countries, which pursued exchange rate targeting but experienced financial crises because their policies were not perceived as credible. The adoption of IT, by contrast, may lead to a more stable currency since it signals a clear commitment to price stability in a freely floating exchange rate system. This, of course, does not mean that monitoring exchange rate developments should not be undertaken. Indeed, weighting them into decisions on setting monetary policy instruments is thought desirable. This is actually an approach recommended in the case of asset pricing in general (such as house and stock prices in addition to exchange rates), in the setting of interest rates within an IT framework. Bernanke and Gertler (1999) are emphatic when they argue that “It is neither necessary nor desirable for monetary policy to respond to changes in asset prices, except to the extent that they help to forecast inflationary or deflationary pressures” (p. 115). Such an approach is thought to make asset price bubbles less likely thereby promoting the objective of financial and price stability.⁵

The fourth is that the monetary policy rule in equation 3 embodies the notion of an equilibrium rate of interest, labelled as RR^* . Equation (3) indicates that when inflation is on target and output gap is zero, the actual real rate set by monetary policy rule is equal to this equilibrium rate. This equilibrium rate has often been seen as akin to the Wicksellian ‘natural rate of interest’ equating savings and investment at full employment. Equation (1) yields for an equilibrium outcome (hence $Y^g = 0$), $a_0 + a_3[R - E(p)] + a_4(rer) = 0$, and an equilibrium interest rate equal to $-(a_0 + a_4 rer)/a_3$ (recall that a_3 and a_4 are expected to be negative, and a_0 is expected to be positive). An ‘equilibrium rate of interest’ which can be considered a ‘natural rate’ would require that a_0 was not shifted through fiscal policy or through ‘animal spirits’ (shifting the investment function) and that the real exchange rate was unchanged.

⁵ The issue of asset price targeting, though, is highly controversial. In addition to Bernanke and Gertler (1999), which represents the consensus view, Greenspan (2004a, 2004b) argues that dealing with the consequences of asset bubbles is preferable to dealing with the bubble itself (see, also, Nickell, 2005, for a recent restatement of the consensus view). There is, however, an alternative view, which argues for asset price control (see, for example, Goodhart, 2001; Cecchetti et al., 2002; Arestis and Karakitsos, 2005).

3. NCM Policy Implications and Monetary Rules

3.1 NCM Policy Implications

The economic policy implications of the NCM are very clear. Fiscal policy should only be concerned with possibly broadly balancing government expenditure and taxation, effectively downgrading its importance as an active instrument of economic policy. This is an assumption based on the usual arguments of crowding out of government deficits and thus the ineffectiveness of fiscal policy (see, however, Arestis and Sawyer, 2003b, for a critique and a different view). Monetary policy, by contrast, has been upgraded in the form of interest rate policy (but not control of the stock of money), where a major objective of policy is “maintaining price stability” (King, 2005, p. 2).⁶ This policy is undertaken through inflation targeting (IT). Money supply targeting has been largely dropped from view.⁷ This downgrading has been related to three factors, The perception that the demand for money relationship has displayed instability, the general failure to control the level and growth of the money stock in the 1980s under regimes of monetary control as well as the abrupt change in inflation expectations in the 1990s (see, for example, Agénor, 2002; HM Treasury, 2003).⁸ IT is also seen to be concerned with a final rather than intermediate objective. The economics of IT are firmly embedded in equations (1) to (6), especially equation (3). This third equation entails an important aspect for IT, namely the role of ‘expected inflation’. The inflation target itself and the forecasts of the central bank are thought of as providing a strong steer to the perception of expected inflation. Given the lags in the transmission mechanism of the rate of interest to inflation, and the imperfect control of inflation, inflation forecasts become the intermediate target of monetary policy in this framework where the ultimate target is the actual inflation rate (Svensson, 1997). Under these circumstances, “The central bank’s forecast becomes an explicit intermediate target. Inflation targeting can then be viewed as a monetary policy framework under which policy decisions are guided by expected future inflation relative to an announced target” (Agénor, 2002, p. 151). Furthermore, the target and forecasts add an element of transparency seen as a paramount ingredient of IT. Consequently, inflation forecasting is a key element of IT. The emphasis, however, on inflation forecasts may entail a serious problem due to the large margins of error in forecasting inflation, which can damage the reputation and credibility of central banks. Utilizing a probabilistic approach under these circumstances (the so-called ‘fan chart’) to present inflation forecasts (see, for example, Blix and Sellin, 1998) can alleviate potentially the reputation and credibility problems. The central bank by signalling the uncertainty inherent in economic forecasts can contain the potential damage to its reputation and credibility.

There can be a self-justifying element though to inflation forecasting in so far as inflation expectations build on forecasts, which then influence actual inflation. The centrality of inflation forecasts in the conduct of this type of monetary policy represents a major challenge to countries that pursue IT. Indeed, there is the question of the ability of a central bank to

⁶ King (2005) also argues that “Far from being ineffective, a monetary policy aimed at price stability has proved to be the key to successful management of aggregate demand” (p. 2).

⁷ There is still the argument that even when central banks thought they were targeting money growth they were in fact pursuing inflation targeting. The Bundesbank case is one such example as Bernanke and Mihov (1997) show empirically (see, also, Clarida and Gertler, 1997), where money targets were explicitly geared to inflation targets, and implicitly to output and exchange rate. Money targets were actually missed when they were in conflict with these macroeconomic objectives (Romer, 2000).

⁸ King (1997a, 1997b) argues for the superiority of IT over a money-supply rule, in that it results in optimal short-run response to shocks, in a way that money-growth targeting does not (see, also, Svensson and Woodford, 2003).

control inflation. Oil prices, exchange rate gyrations, wages and taxes, can have a large impact on inflation, and a central bank has no control over these factors. To the extent that the source of inflation is any of these factors, IT would have no impact whatsoever. Negative supply shocks are associated with rising inflation and falling output. A central bank pursuing IT would have to try to contain inflation, thereby deepening the recession. Even a central bank with both price stability (meaning low and stable inflation) and economic activity (meaning stabilizing output around potential output) objectives, would still behave in a similar fashion, simply because central banks are evaluated on their ability to meet inflation targets rather than output growth targets.

3.2 Monetary Rules

Equation (3) is of paramount importance in terms of the NCM economic policy implications. It depicts the monetary policy rules associated with NCM, which can be distinguished into *ad hoc* policy rules and rules based on explicit optimization. It should be stated at the outset, though, that since knowledge of the economy is incomplete and evolving all the time, optimal policy is time dependent. The Governor of the Bank of England (King, 2005) suggests that “there is no time-invariant policy reaction function which could describe the policy intentions of a central bank. Rather monetary policy in practice is characterised by a continuous process of learning” (p. 8), and that “to describe monetary policy in terms of a constant rule derived from a known model of the economy is to ignore this process of learning” (p. 10). It is important to bear this in mind in the discussion that follows in this section.

We examine the *ad hoc* rules first.

3.2.1 Ad Hoc Monetary Rules

The best-known example of the *ad hoc* type (assuming no interest rate smoothing, and no stochastic shocks for simplicity) is the Taylor rules, since Taylor (1993). It can be shown as in equation (3)’:

$$(3)' \quad R_t = RR^* + d_1 Y_t^g + d_2 (p_t - p^T)$$

where the symbols are as above. In Taylor (1993) the original monetary-policy rule formulation was as in (3)’, with the coefficients given the values of $d_1 = 0.5$, $d_2 = 1.5$, $p^T = 2$ per cent and a constant term of 2 per cent, which implied a 2 per cent value for RR^* .⁹ Taylor’s (op. cit.) claim was that expressing the rate of interest, the Federal funds rate in the case of the US, as a linear function of actual inflation from a desired rate and the output gap, not only was it a good description of monetary policy in the US, but also a helpful policy recommendation.

In this framework, d_2 is required to be greater than one, the ‘Taylor Principle’, for unique equilibrium in sticky-price models (Taylor, 1999; Woodford, 2001).¹⁰ In other words, the

⁹ Equation (3)’ can be written equivalently as: $(R_t - p_t) = 2 + 0.5Y_t^g + 0.5(p_t - p^T)$. This makes the point that equation (3)’ involves the use of the real rate of interest as an indicator of monetary stance.

¹⁰ See Svensson (2003) for a recent critique and further elaboration, as well as for a discussion of rules of monetary policy and a suggestion for describing IT as a ‘forecast-targeting rule’, or ‘forecast targeting’ (with the Reserve Bank of New Zealand being cited as an example of this procedure). This is essentially what Blinder (1998) describes as ‘dynamic programming’ and ‘proper dynamic optimization’. So the distinction emerges between targeting and instruments rules defined as follows: “A specific targeting rule means a commitment to

nominal rate is increased more than one-to-one with respect to any increase in inflation. This policy reaction ensures that the real rate of interest will act to lower inflation. Given inflation, the real rate of interest is also increased as a result of output-gap positive changes. Taylor rules, therefore, require monetary policy to act automatically to inflation and output. We may note that a Taylor rule does not resort to dynamic optimization; it is a rule-of-thumb, based on historical data to formulate benchmark policy (Taylor, 1999). Another example of *ad hoc* policy rules is the inflation-forecast-based (IFB) rules (Batini and Haldane, 1999; Orphanides, 2001):

$$(3)'' \quad R_t = RR^* + d_3 E_t(Y_{t+k}^e) + d_4 [E_t(p_{t+m}) - p^T]$$

where the monetary policy instrument (typically the short-term rate of interest under the control of the central bank) responds to deviations of expected, rather than actual, inflation from target and output gap, thereby allowing to bypass the policy lags that are present when inflation is sticky.¹¹ The nominal rate of interest depends on a distributed lead of m -period-ahead inflation forecasts made at time t , p_{t+m} ; similarly for the output gap, $t+k$ periods ahead. In both cases just considered, we have instrument rules, which express the monetary policy instrument as a simple and usually linear function of deviation from their target levels of a few key macroeconomic variables (essentially inflation and the output gap), either as outcome-based rules (equation 3') or forecast-based rules (equation 3''). Further modifications of Taylor rules include the introduction of lags of inflation and output gap, since it is not possible to know the actual values at the time of setting the rate of interest (McCallum, 1999). Interest rate smoothing in the form of a lagged short-term interest rate is another modification introduced (Clarida, Galí and Gertler, 1999). The unemployment gap as opposed to the output gap has been used, on the reasonable assumption that the natural rate of unemployment is easier to measure than trend output (Taylor, 1999; Orphanides and Williams, 2003); the growth rate of both these variables has also been used (McCallum, 1999; Orphanides and Williams, 2003), as well as other variables, such as the exchange rate (Chadha, Sarno and Valente, 2004).

These Taylor-type rules have been criticized (for example, Svensson, 2003) in terms of the possibility of real indeterminacy: if the rise in the nominal rate of interest in response to a rise in expected inflation is not high enough, then the real rate of interest falls raising demand which fails to check inflation. *Mutatis mutandis*, an excessive rise in the nominal rate of interest in response to a rise in expected inflation would also cause indeterminacy. However, indeterminacy can be avoided if monetary authorities respond rather aggressively, that is with a coefficient above unity to expected inflation, but not overly higher than unity. This result has been demonstrated in the closed-economy case (Clarida, Gertler and Galí, 2000) as well as in the small open-economy case (De Fiore and Liu, 2002). Further ways to alleviate the indeterminacy include: gradual response by the monetary authority, that is high interest rate smoothing; the monetary authority responds to averages of expected inflation, instead of expected one-period inflation; the monetary authority augments the instrument rule by also responding to the output gap (Batini and Pearlman, 2002).

set the instrument rate so as to achieve a specific target criterion for the target variables, and an instrument rule expresses the instrument as a prescribed function of variables in the current information set" (Österholm, 2005, footnote 3, p. 220).

¹¹ Orphanides (2001) actually showed that forward-looking Taylor rules estimated on real time data (as opposed to *ex post*) describe policy much better than contemporaneous specifications (see, also, Huang et al., 2001).

Although the empirical work on Taylor rules appears to be robust (Levin et al., 1999; Taylor, 1999; Rudebusch, 2002) it, nonetheless, entails a number of problems. We may summarize the main problems succinctly. There is to begin with the lack of consensus on the price variable utilized for the purposes of equation (3), nor is there a satisfactory way of estimating the output-gap variable; in fact, estimating the output gap requires contentious assumptions (Goodhart, 2005, p. 7).¹² The equilibrium rate of interest (RR^*) is a difficult variable to estimate. As noted above, the equilibrium rate of interest depends on (in the model used here), *inter alia*, the coefficient a_0 (which we have taken to reflect the fiscal stance) and the real exchange rate. More fundamentally, it is an unobservable variable. There is the question of whether current or lagged data should be used in the estimation of interest rates, or indeed forward-looking estimates should be used. A further problem is whether current-time or real-time data should be used to account for revisions in data, especially so since output data are subject to continuous revision over a number of subsequent years. Also should a smoothing variable be considered? Still, should the Taylor rule be treated as a reduced form, or as a structural reaction function? Indeed, and for the purposes of this paper, should the exchange rate be incorporated in Taylor rules, or ignored since its impact is reflected in aggregate demand and cost of production (see Hamalainer, 2004, for a recent review of the relevant literature and a detailed discussion of the problems summarized here).

A recent study by Carare and Tchaidze (2005) draws attention to inconsistencies in establishing simple *ad hoc* rules as in (3)' and (3)'' above. Very different versions of Taylor rules can fit the US data well. The original formulation by Taylor (1993) followed closely the observed path of the US federal funds rate over the period 1987-1992 (see, also, Taylor, 1999). But, then, so did alternative formulations of monetary policy rules, as shown by Carare and Tchaidze (op. cit.). The latter study demonstrates that this is due to the abuse of monetary rules in the sense that they “are misspecified, incorrectly estimated, or not optimal”. A list of factors that contribute to this abuse is provided, “ranging from straightforward empirical difficulties, such as short samples or serial correlation of the variables, to problems of a theoretical nature, such as the emergence of multiple equilibria under Taylor rules or their nonoptimality” (p. 23). The same study also suggests that in those countries where the exchange rate channel forms an important transmission mechanism, Taylor rules become more complicated and the probability of abuse is even greater. An even more recent study, Österholm (2005) finds little support for cointegration and out-of-sample forecasts in the case of US, Australian and Swedish data. Taylor rule regressions are likely to be inconsistently estimated, clearly implying that the estimated parameters cannot be meaningfully interpreted (see, also, Gerlach-Kristen, 2003). Österholm (op. cit.) concludes that “the lack of cointegration and its poor forecasting ability under such circumstances means that the Taylor rule is not even a close enough approximation to central bank behaviour to be judged as empirically relevant” (p. 240). Taylor rules are, thus, incompatible with data. Consequently, a great deal of caution is indicated when central bank policy is evaluated against Taylor rules.

3.2.2 Explicit Optimization Monetary Rules

Taylor rules have been questioned on another important theoretical point. This is that it is unlikely to result from a solution to a central bank's optimization problem. Especially so if it

¹² Most Taylor-rule estimates use data for the output gap, while acknowledging the difficulties with this data. More recently, however, it is acknowledged that since a close relationship exists between output gap and output growth, the latter may be used instead as a way of avoiding the difficulties with output gap data (Orphanides and Williams, 2003). Indeed, policy makers should perhaps concentrate more on output growth rates rather than on output gaps (Goodhart, 2005).

is the case that state variables, other than inflation and output gap are important in enabling monetary policy to achieve its objectives (Svensson, 2003). Real exchange rates, terms of trade, world output and interest rates are such variables, which if not accounted for could produce efficiency loss in monetary policy. A richer central bank reaction function emanates if such variables were to be properly incorporated. Rules based on optimization invariably rely on setting the monetary policy instrument as a solution to an optimization problem defined by an explicit loss function. The latter describes the costs of the specific goal variables deviating from their target levels, and a structural model of the economy. In other words, minimization of the loss function subject to the constraints imposed by the economy's structure (summarized in the structural model utilized) produces a model-specific optimal interest rate reaction function. This determines the optimal rate of interest as a function of state variables. An inflation-targeting framework would employ a loss function of the general form (see, for example Svensson, 1999; Walsh, 2002; Woodford, 2004):

$$(3)''' \quad E_t \sum_{\tau=0}^{\infty} \delta^{\tau} [(p_{t+\tau} - p^T)^2 + \lambda(Y^g)_{t+\tau}^2]$$

where the parameter δ is a discount factor that satisfies $0 < \delta < 1$, and the parameter λ is the weight on output fluctuations, relative to inflation deviations. The form interest rate policy may take is three-fold. The simplest is a 'weak form' of IT, meaning that the central bank has a desired inflation rate (p^T), which need not be announced, and the reaction function may also include the output gap. A 'semi-strong form' of IT, which is concomitant to pursuing an optimal monetary policy that minimizes a loss function like (3)''' above, but without any precommitment (Svensson, 1999). A 'strong-form' IT, which is the same as the 'semi-strong form' IT but under precommitment; for example reduce inflation today but run negative output gaps in the future (King, 1997a). An alternative but simpler distinction between strict IT, when the central bank is only concerned with meeting the set inflation target and thus only deviations of inflation from its target would appear in equation (3)''', and flexible IT, when the central bank is concerned not merely with IT but also with the stability of other variables, such as output, exchange rate and employment. So that the loss function contains both deviations of inflation and output gap from their targets. In the latter distinction, it is clear that the form of interest rate policy relies heavily on the value of λ .

It follows that whatever form IT might take we have the notion of target rules, whereby the appropriate setting for the monetary policy instrument is defined as the solution to a constrained optimizing problem facing the central bank. The first-order condition under such an exercise is given by (3)'''':

$$(3)'''' \quad E_t[p_{t+1} - p^T] = (\lambda/b_1)E_t[(Y^g_{t+1})]$$

where b_1 is the coefficient on the output gap in (2) above. (3)'''' expresses a linear trade-off between the deviation of inflation from its target and the output gap, and states that the expected marginal benefit of reducing inflation from its target should be equal to the expected marginal cost of inflation reduction. A larger λ , or smaller b_1 , implies higher cost in reducing inflation, which may very well imply that the monetary authority is prepared to tolerate larger deviations of inflation from its target, by appropriately manipulating the monetary instrument dictated by the optimization procedure.

In general terms, the optimal rule derived from (3)''' would not be given by the instrument rule as in either (3)' or (3)'', although this is not impossible (Kuttner, 2004). In fact, there is a

degree of complementarity between instrument and target rule, in that a target rule defines inevitably an instrument rule. At the same time, it is always possible to define a loss function and specify an economic model that would produce a specific instrument rule as a solution to an optimization exercise (Issing, 2004); indeed, Taylor rule versions can be derived as solutions to optimization problems (Woodford, 2001).

The possibility of incorporating exchange rates and other variables, as argued above, in both a Taylor Rules formulation and in an explicit optimization monetary rules type of formulation has been discussed in the literature (Taylor, 2001; Svensson, 2000, 2003). That exchange rates can be useful indicators of inflationary pressures in the economy is not a controversial issue. What is controversial is whether exchange-rate stabilization should be a direct target of policy. This is a testable hypothesis and a recent IMF paper (Sgherri, 2005) tests this proposition by utilizing the explicit optimization approach and deriving a Taylor Rules type of monetary policy rule, which incorporates (rer) in an equation like (3.1)':

$$(3.1)' \quad R_t = RR^* + d_1 Y_t^e + d_2 (p_t - p^*) + d_3 [(rer)_t - (rer)^e]$$

where $(rer)^e$ is the equilibrium real exchange rate. A similar formulation to (3.1)'' is also possible, which would imply that the central bank attempts to target expected realignments from purchasing power parity. Sgherri (op. cit.) tests such a proposition in the case of six countries, Australia, Canada, New Zealand, Norway, Sweden and the UK, to conclude that "exchange rates are generally *not* key for systematic monetary responses in inflation-targeting, open economies" (p. 23). It would appear to be the case that when central banks target core, rather than headline, inflation in particular, the exchange rate does not appear to contribute significantly to monetary policy rules. They can only be useful as information variables, as suggested above in equations (1) to (6).

The NCM approach to monetary policy, and particularly that associated with the optimal policy rules, runs into two major objections which were themselves often raised against the fine tuning use of fiscal policy in the past. The first is that monetary policy attempts a form of what may be termed hyper fine-tuning. Although this criticism may be modified by reference to the degree of interest rate inertia, monetary policy does attempt frequent adjustments to the policy instrument (interest rate) in pursuit of the policy target (the rate of inflation). Interest rates are subject to decision-making on a frequent basis, e.g. monthly in the case of the UK. The decision may often be to leave interest rates unchanged, but the same decision-making process is followed. The issues of availability of information on the present and future position of the economy and the potentially destabilising lags in the impact of policy changes also arise here.

The second arises from the 'optimal policy rules', which are derived from the optimisation of a loss function subject to a specific macroeconomic model. There are two major issues, which arise in this regard. First, the loss function is often taken as a quadratic loss function in inflation (relative to target rate) and deviations of output from a supply-side equilibrium. The loss of a deviation of inflation from target is assumed to be symmetric. Further, the loss of deviation of output from the supply-side equilibrium is also symmetric, and hence assumes that the supply-side equilibrium level of economic activity is in some sense optimal. Consequently, higher as well as lower levels of economic activity (relative to that equilibrium) involve losses of economic welfare. Optimum supply-side equilibrium would be based on Pareto optimality and perfect competition. Interestingly enough, the new-Keynesian framework views the economy in imperfect competition terms, and there is then

no suggestion that the equilibrium is (welfare) optimal. Unless one accepts the loss function then the policy rules thereby derived do not follow. The loss function indicates that output above the supply side equilibrium involves a loss comparable to the loss if output were below the supply-side equilibrium. Second, the development of these rules is then obviously subject to the objection that the relevant information on which is the correct model of the economy is not available. This can range from a lack of precise estimates of what is otherwise a ‘correct’ model of the economy through to the adoption of a model of the economy, which is highly misleading. Hence, the rules derived above may be optimal if the world conformed to the NCM but would not be optimal if the world were rather more Keynesian. Whether the real world actually conforms to the NCM view is not easy to ascertain.

4. Summary and Conclusions

This contribution has attempted to highlight the main characteristics of what has come to be known as the New Consensus in Macroeconomics. NCM has been generally analysed under the assumption of a closed economy. This paper has dealt with the open economy NCM where the role of the exchange rate provides an additional channel of monetary policy. Not only has this paper attempted to clarify the main features of the NCM but it has also focused on its main policy implications and monetary rules. In doing so the paper has also critically raised a number of issues with both the NCM’s theoretical foundations, as well as with its monetary policy rules.¹³ On both accounts, a great deal more research is necessary to tackle the issues raised in this contribution and, of course, many other relevant issues, which have surfaced in the literature and a number of them have been summarized in this contribution.

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¹³ We have also discussed elsewhere (for example, Arestis and Sawyer, 2003a, 2004, 2005) the problematic nature of both NCM and IT.

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