SECRET

SRWCAX

→ PM

Prime Minister 2 18

PRIME MINISTER

TODAY'S MARKET REPORT

I attach today's report.

Before it arrived the Treasury had rung me to warn of the intervention entry. You will see that, bizarrely, we seem to have carried out significant intervention to hold the pound down. This was as much a shock to the Treasury as it will be to you. It was apparently undertaken by the Bank without reference to the Treasury. They rationalised it on the basis that the market conditions were sufficiently strong to carry out the usual funding of BAOR operations on ~~available~~ terms.

That does not seem to me - or the Treasury - in the least convincing. Given the size of our Reserves there is no need at all to go out and buy fresh foreign currency for this purpose. As it happens, having been quite strong this morning, sterling did slip by this afternoon at more or less when the intervention was carried out which makes it all the more unfortunate.

On a lighter note, you will also see that the Spanish have again been quite active - $244 million though not on yesterday's scale.

pp. Duncan Smith
Duty Clerk

(PAUL GRAY)
20 June 1989

SECRET

Your queries below:

(1) Yes.

(2) Chancellor did not know that this letter he came to you at 1700 meeting.

Rec'd 21/6

Redacted

(1) Has the Treasury taken the requisite action with the Bank?

I wonder why this was not mentioned to me by the Chancellor last evening? NS

NatWest Capital Markets

P-STAR AS A MONETARY INDICATOR FOR THE UK

- UK inflation has soared and base rates have risen sharply. This has prompted active debate about the proper conduct of monetary policy.
- The mainstream alternatives to the current pragmatism are full EMS membership and a return to overfunding. However,both strategies have been discredited and the authorities claim that neither are on the policy agenda at present.
- This paper proposes a different approach - based on narrow money (M0) and the P-star methodology developed recently by the US Federal Reserve. In fact, the approach finds its roots in classical monetary theory and the Quantity Equation analysis developed by Irving Fisher in the 1920s.
- We find that the P-star approach accurately predicts long-run inflationary trends in the UK. The main theme running through our work is the robustness of M0 as a predictive tool.
- Contrary to conventional wisdom, M0 gave a clear warning about the inflation take-off in the mid-'70s. More recently, our P-star approach identified that inflation pressures were brewing as early as 1986.
- On the face of it, the sharp deceleration in M0 in recent months is encouraging. However, our P-star measure is still signalling inflation problems ahead - the monetary excesses of the past have not yet been sufficiently unwound. Moreover, there is evidence that the recent fall in M0 growth has been exaggerated by faulty seasonals. A further tightening of monetary policy may therefore be required.
- The P-star approach is reportedly playing an important role in Fed thinking on the direction of US interest rates. Mr Greenspan, in particular, is backing the Fed's experimental work on the measure. Our analysis shows that the methodology can also be successfully applied to the UK and we conclude that P-star should be given a prominent position in the authorities' analysis of monetary conditions.

Stephen Hannah - Head of Research
Adrian James - Economic Assistant

16th June 1989

Time for a monetary rethink

UK inflation has turned out far worse than expected, severely undermining the authorities' credibility. Policy is widely perceived to be in disarray - pulling the rug from under sterling and forcing the Chancellor to raise base rates. After a pre-election "go" in 1986-87 the economy now faces an almighty "stop". For a government that has prided itself on the absence of "stop-go" policies and a supply-side revolution, the spectacle of a "boombust" economy will be deeply disappointing - it could also prove to be an electoral disaster. Little wonder, therefore, that there has been active discussion about alternative policy approaches.

Mr Lawson's favoured alternative to the current pragmatism is the EMS exchange rate mechanism. However, the experiment with DM targetting in 1987-88 dismally failed and, as the Prime Minister has indicated, was a reason for the inflation surge in 1988-89. Far from being a device to stabilise prices, the experiment with nominal exchange rate targetting actually diverted the Chancellor from worrying domestic monetary signals and so allowed dangerous inflationary pressures to build up. It now seems highly unlikely that the Prime Minister will alter her attitude to ERM membership ahead of the next general election. Indeed, recent events may well have hardened her opposition to exchange rate fixing regimes. On the international stage, too, there is increasing disillusion with the concept of fixing nominal exchange rates (see the latest BIS annual report). Arguably the ERM itself might enter an unfashionable phase - particularly when exchange controls are lifted next year and volatile pressures build up.

One alternative to fixed exchange rates - and the subject of heated debate recently - is a return to overfunding and broad money targetting. However, the effectiveness of overfunding in controlling broad money growth is questionable. The money market shortages created by "excess" gilt supply in the pre-1985 regime generated substantial central bank demand for bills, which in turn created hard arbitrage opportunities (ie round-tripping). The broad money benefits of overfunding were therefore offset (to an unknown extent) by arbitrage-related bank lending. By the mid-1980s overfunding became a discredited policy and we doubt there is much appetite for its re-introduction. Mr Lawson has already flatly denied plans for a change in the funding rule. Moreover, the return to old (and failed) remedies would undermine the "political economy" of monetary policy.

At a more technical level, broad money targetting remains hampered by the uncertainty surrounding velocity trends and the possibly perverse response to changes in interest rates (a tightening of monetary policy increasing the asset demand for interest-bearing balances). Attempts have been made to weight various components of broad money according to their "moneyness" ie giving higher weights to non-interest bearing transactions balances. However, the difficulty here is that the introduction of high interest cheque accounts has undermined the validity of the calculations, making the interpretation of synthetic broad money measures just as problematic as the more familiar, plain vanilla, originals.

In our view, narrow money provides the best anchor for monitoring inflationary conditions and guiding interest rate decisions. As we argued a year ago (UK Financial Bulletin - June 1988) the monetary base has played an impressive role in warning of inflationary pressures ahead. This paper builds on our earlier analysis - with a longer database going back to the early 1960s - and argues that, as a monetary indicator, M0 should command a prime position.

This particular piece of research was inspired by recent work at the Fed which developed an M2 based measure of equilibrium prices known as P-star†. This indicator was developed at the suggestion of the Fed Chairman, Alan Greenspan, and is still experimental. However the measure is thought to have influenced the Fed's recent decision to "desnug" its monetary stance. The first public mention of the P-star indicator came in February, at Mr Greenspan's monetary policy testimony.

The Fed's analysis showed that P-star had a useful role in signalling long-run inflationary pressures but said little or nothing about the direction of inflation in the short-term. As such - and attractive to monetary purists - the authorities could not use the P-star indicator to justify economic fine tuning. Moreover, another important aspect of the P-star work (consistent with its "long-termism") is its emphasis on equilibrium levels rather than growth rates. Thus, relatively slow monetary growth may not be enough to provide reassurance about inflationary trends. If monetary growth has been excessive in the past then it may be that, despite a deceleration, the existing stock is excessive in relation to underlying transactions and could therefore still present an inflation threat.

† *M2 per Unit of Potential GNP as an Anchor for the Price Level, J.J. Hallman, R.D. Porter and D.H. Small, Federal Reserve Board of Governors, April 1989.*

Fisher identity and P-star

There is nothing new about the theory underlying P-star. The idea goes back to Irving Fisher's 1920 analysis of the purchasing power of money. At the centre of this analysis is the famous Quantity Equation

$$MV = PY$$

Where the money stock (M) times velocity (V) equals the value of transactions - real GDP(Y) times its deflator (P).

Indeed this is an identity, rather than an equation, used to define velocity. Nevertheless, on the basis of some simplifying assumptions, the Fisher approach can provide an insight into long-run inflationary forces.

The main assumptions made in modelling P-star are

- Velocity is not necessarily constant (although the Fed work found that this was the case as far as US M2 was concerned) but changes at a steady, predictable rate in line with "habits" and technological change.
- Output has a steady, long-run equilibrium growth path determined by real, non-monetary forces.
- Monetary growth is exogenous and controllable.

P-star is then determined by taking the current money stock and long-run trend values of velocity and output. In other words:

$$P\text{-}star = P^* = M.V^*/Y^*$$

This equation identifies a clear, long-run relation between monetary growth and inflation. The equation is specified in equilibrium terms for P,V, and Y in acknowledgement that short-run inflation is likely to be dominated by dynamics and noise rather than monetary growth.

Out of steady states, the P-star approach argues that inflation will be driven by the deviation between actual and equilibrium prices (product market prices are thus assumed to be sticky). When the equilibrium price is above its actual level (because, say, of an expansionary monetary shock) then inflation accelerates until $P^* = P$. When the equilibrium price is below its actual level then inflation decelerates until equality (equilibrium) is restored.

Economic theory cannot be specific about the speed of adjustment and thus the actual inflation rate. To give the model empirical value, therefore, a speed of adjustment equation has to be added to the P-star model. For example, we might specify that:

$$INF_t^* = \beta\,(p^* - p) + INF_{t-1}$$

Where * denotes an equilibrium/expected value and the lower case p denotes the log of P. The β value represents the speed of adjustment coefficient.

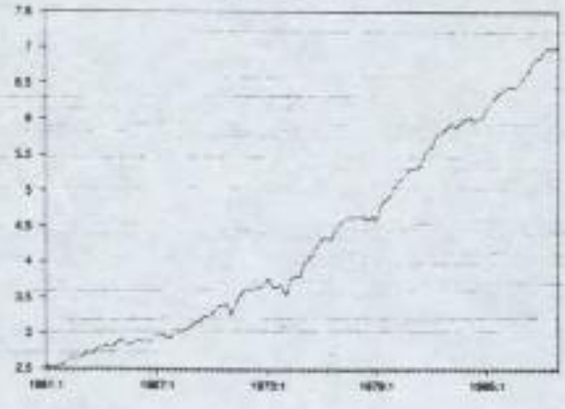
The above equation has the property that when actual inflation is in line with expectations then P converges with P-star. The steady state is also characterised by an inflation rate which equals monetary growth plus trend velocity growth less underlying output growth. If the system is then "shocked", the period of time taken to restore equilibrium will be determined by the lags specified and the relevant speed of adjustment coefficients.

In modelling P-star for the UK we have focussed on the monetary base (M0) as the appropriate money supply measure. Unlike the broad money measures, the velocity trend is relatively stable with its variability explained, to a significant extent, by cyclical variations in interest rates. As our research last summer indicated, the M0 measure has relatively attractive attributes as a monetary indicator: timeliness, a relatively stable velocity trend, a well determined interest rate response, and accurate measurement.

Our data set covers the period 1961-1988 (the final section of this paper covers more recent events) and detailed definitions and sources are provided below. The M0 data were adjusted for major breaks, in particular the 1981 change in the bankers' balances regime.

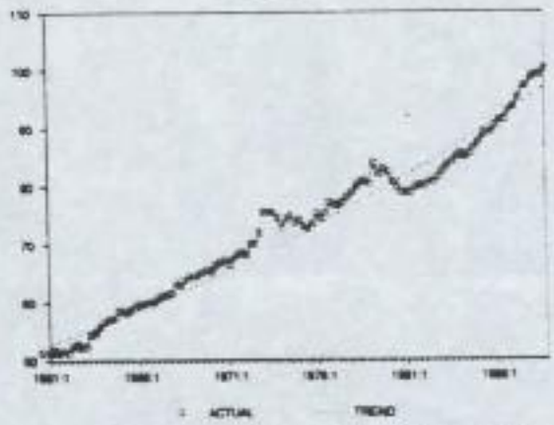
Our analysis of velocity (see chart) showed that the trend was broadly stable over the period. However, there was evidence of a statistically significant break after 1974 so a split time trend was incorporated into the preferred velocity equation. The estimations showed velocity trend growth of just over 3% in 1961-73 and around 4¼% thereafter. These growth rates were used in the P-star calculations.

M0 VELOCITY



The estimation of underlying output growth is more contentious. However, we have adopted a simple approach, taking the average growth rate seen since 1960 (around 2¼% per annum). Some have argued that Britain's underlying growth rate has increased over the past decade. If so, then our P-star measure for the recent period would be too high and inflationary pressures exaggerated. However, the output data do not suggest an upward break in the growth trend over the past decade (in fact, the reverse) and, as our analysis of UK inflation history shows, the P-star approach (based on a 2¼% trend) tells a perfectly consistent story about the most recent take-off in prices. More detailed analysis, such as a recent National Institute study of productivity using the new employment data (May 1989 Review), also questions whether there has been a sustainable shift in trend growth since the 1950s and 1960s.

GDP



On the basis of the assumptions outlined above the level of P-star in relation to P was calculated for the full period 1961-88. The following sections analyse the results and discuss how well the P-star methodology explains the UK's inflation history. Before moving on, it is worth dwelling on what our trend values imply for the relation between equilibrium inflation and M0 growth. Focussing on the post-'74 period, the equilibrium inflation rate is given by

$$\dot{p}^* = \dot{m} + \dot{v}^* - \dot{y}^* = \dot{m} + 2$$

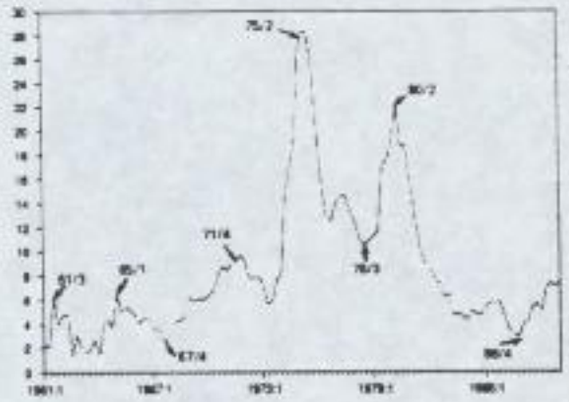
where lower cases represent logs of P*, M, V* and Y* respectively. The dot denotes a one-period change.

In other words, if a government is seeking a steady inflation rate of, say, 5% then not only should the P*/P ratio be unity but also M0 growth should be around 3% (the middle of the current target range). As we show in the next section, although some variation of M0 growth around 3% is acceptable in the short-run (temporary velocity cycles, etc) any sustained period of M0 growth above 3% should, on the basis of historical evidence and the assumed 5% inflation objective, give cause for concern.

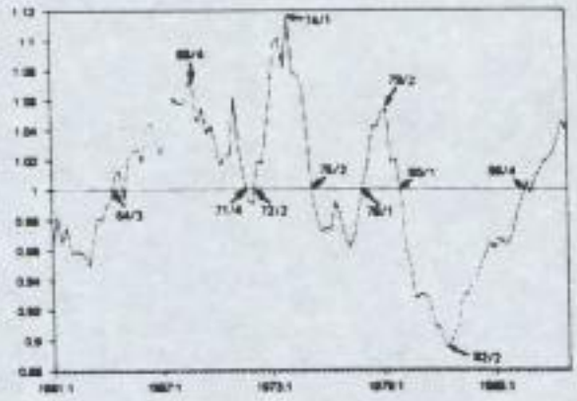
The P*/P ratio and inflation, 1961-1988

The history of inflation (as measured by the GDP deflator) and the degree to which its movements are foreshadowed by the P*/P ratio are depicted in the charts below. By construction the mean value of the ratio is unity over the period analysed.In other words the analysis assumes that, over the long run, prices converge to their equilibrium level (if we did not assume this then the whole P-star methodology becomes suspect).

GDP DEFLATOR YOY %



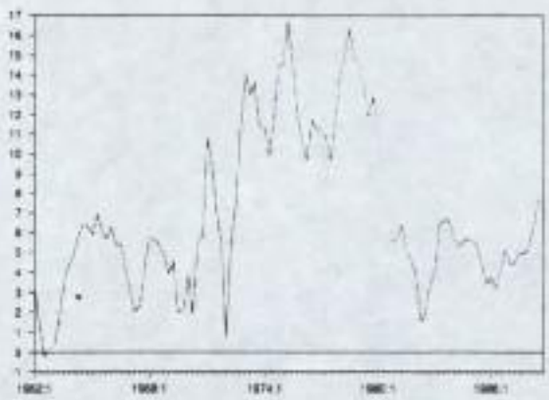
P*/P



Before analysing the charts it is worth recalling the correct interpretation of a unit value for P*/P. In particular, a unit value does not imply price stability, it simply means that P* and P are growing at the same rate (actual = expected inflation). To determine the equilibrium rate we need to look at monetary growth. If M0 growth is high then so will the equilibrium rate of inflation. The policy implication is that the authorities can in no way regard a unit value of P*/P as a sufficient condition for inflation success. As well as seeking stability in the sense of a steady rate of inflation, the authorities also have to get monetary growth right in order to avoid inflation settling at too high a level.

In order to describe the UK's inflation history over the past 25 years - and the ability of the P-star approach to spot problems ahead of time - it is convenient to split the period into various phases:

M0 GROWTH



Phase I : 1964-1971

- The period began with a reflationary budget and M0 growth picking up sharply (reaching 7% by mid-'65 having been relatively flat in 1962). The P*/P ratio moved above unity in 1964Q3 and remained there for much of the period. Since M0 growth was already running at around 6% at this stage, the authorities had a clear warning signal of inflationary pressures ahead.

- However, this pressure was not at all evident in the inflation numbers themselves for some time. Indeed, between 1965Q1 and 1967Q4 the inflation rate fell from 6.4% to 2.4%. Does this mean the P-star model failed? The answer is no.

- Pressures **were** evident in 1965-67 but were prevented from being translated into actual inflation because of price controls. A prices and incomes freeze was in operation between July 1966 and January 1967 followed by a six month period of "severe restraint". It was the growing balance of payments deficits which reflected excess demand pressures and eventually led to the 1967 devaluation. Following this and the lifting of strict price and wage controls then inflationary pressures were let out of the bottle and inflation reached almost 10% by the end of the period.

Phase II : 1972-1978

- The P-star measure was signalling through 1971 that inflationary pressures might soon stabilise and indeed there was some respite between 1971Q4 and 1973Q2 (when inflation fell from 9.6% to 5.6%). Again, however, this deflation (as opposed to the stability implied by P*/P) was created by artificial forces, notably the 90 day statutory freeze on prices and incomes imposed in November 1972. Through 1972 monetary (M0) growth picked up very sharply and this continued for some time (this coincided with the floating of the sterling exchange rate).

- Note that the P-star measure was very clearly signalling problems as early as 1972 - disputing the conventional wisdom that M0 failed to warn about the inflation take-off in the mid-'70s. Even though the 1973 oil price hike exaggerated the impact of monetary excesses, it is clear that there was still a policy induced inflation problem during this period. As inflation took off in 1974-75 so P*/P began to fall sharply (real M0 growth tailing off). Between 1975Q2 and 1978Q1 the P-star measure suggested inflation would ease back - as it did - although with M0 growth still at double digit levels the implied equilibrium inflation rate was still very high by the standards of the 1950's and 1960's.

Phase III : 1978-1986

- The P*/P "undershoot" in 1975-78 had been relatively modest and this, coupled with the still high growth of the monetary base, suggested that inflation would remain problematic. Indeed between 1978Q1 and 1979Q2 the P*/P measure rose sharply - shortly followed by another take-off in inflation (again exaggerated by an oil price hike). In 1978-79 M0 growth was running at around 15%.

- From 1979Q2 to 1982Q2, the P*/P measure dipped sharply, substantially undershooting the unit level. This heralded the major deflation that took place between 1980Q2 and 1986Q4 when inflation fell from 22% to 3% - an impressive achievement, albeit at a substantial output and employment cost.

- Through 1986 M0 growth was picking up modestly and the P*/P measure rose towards unity (actual prices being depressed by the collapse in commodity prices). In the early part of 1986, with M0 growth running at around 3¾% and the P*/P measure suggesting that an inflation equilibrium was close to hand, it seemed that the inflation tiger had been tamed. Unfortunately, as the post-1986 experience shows, this was not to be the case.

Phase IV : 1986 to date

- In the latter part of 1986, the P*/P measure moved above unity and this, coupled with M0 growth above 5% should have rung alarm bells. As we argued earlier, velocity and output trends suggest that monetary base growth of more than 3% risks inflation equilibrating at 5% or above. However, by mid-'88, monetary base growth had virtually doubled yet interest rates were pushed as low as 7½%.

- The P*/P measure rose sharply from 1987Q1 onwards, signalling inflationary problems ahead. However, the authorities failed to respond adequately to the situation. Part of the reason was the Chancellor's adoption of an informal DM/£ target which was giving a completely opposite (and, in the event, wrong) signal. The October 1987 "market break" also gave good reason to ignore, temporarily, the conventional indicators in assessing the correct monetary stance. However, by early 1988, it was clear that the equity crash had had little discernible impact on activity. M0 growth continued to rise, and with it the P*/P ratio. Yet interest rates continued to be cut until mid-'88 by which time a substantial amount of inflationary pressure had been accommodated.

- Although M0 growth has recently begun to decelerate, following the sharp rise in interest rates, the current P*/P ratio still remains well above unity. **An important conclusion from our analysis - and one that is rather concerning for the current situation - is that there has not been a substantial fall in inflation without the P*/P ratio falling below unity for a prolonged period. As explained earlier, the periods of falling inflation in 1965-67 and 1972-73 (when P*/P was still greater than one) were because of price freezes whose deflationary impact was not sustainable. This suggests that the inflation peak in the current cycle is still some way off.** We discuss this in greater detail in the concluding section.

P-star forecasts and simulations

Formal analysis was undertaken of the P-star approach to inflation forecasting with the key statistical results reported below. The equations estimated performed well according to conventional econometric criteria and the simulation properties of the preferred equation compared favourably with that estimated by the Fed on US data.

The model tested took the form:

$$DINF = \sum_{i=1}^{4} \alpha_i DINF_{t-i} + \beta_1 (p^*_{t-1} - p_{t-1}) + \beta_2 (INF^*_{t-1} - INF_{t-1})$$

Where:

p	=	log of GDP deflator
INF	=	one-quarter change in p
p^*	=	log of P-star
INF^*	=	one-quarter change in p^*
$DINF$	=	one-quarter change in INF

(see box on data sources and definitions for further details)

KEY ASSUMPTIONS IN CALCULATING P-STAR

Productive potential (Y*)	Real GDP is assumed to grow at an underlying 2¼% per annum. This is the average growth rate seen since 1960. We remain sceptical about whether there has been a significant step up in underlying output growth since 1979 (see also National Institute Economic Review, May 1989).
Velocity trend (V*)	Equations estimated over period 1976Q1-1988Q4 suggested a break in trend in 1974. Estimated velocity trend for 1961Q1-1973Q4 = 3.1% pa; for 1974Q1-1988Q4 = 4.3%pa.

DATA SET AND DEFINITIONS

Monetary Base (M0)	The data were adjusted for breaks in August 1981 and April 1983 (see Bank of England discussion paper No23, Feb 1989). Source: Bank of England
Real GDP (Y)	GDP (A) at 1985 market prices. Source: Central Statistical Office
Prices (P)	GDP (A) deflator calculated by dividing money GDP by real GDP. Source: Central Statistical Office
Velocity (V)	Derived from the identity M0.V=P.Y
P-star (P*)	Derived from the identity M0.V* = P*.Y*

This equation has the property that in a steady state (DINF = 0) P* = P and INF* = INF. In other words, where inflation is steady then the actual price level and the inflation rate are in line with their long-run equilibrium values. This is important for equilibrium and simulation analysis.

The equation was estimated from 1963Q1 to 1986Q4, with eight observations (1987Q1-1988Q4) retained for parameter stability tests. The sample was also split at 1974 as a further test of parameter stability. The results are reported in the table below (the 3rd and 4th lags of DINF were insignificant and therefore excluded from the preferred equation):

Dependent Variable: $DINF_t$

1963Q1 - 1986Q4

Independent Variable	Coefficient	T-Value
$DINF_{t-1}$	-0.499	4.8
$DINF_{t-2}$	-0.199	2.1
$(p^*_{t-1} - p_{t-1})$	0.043	2.4
$(INF^*_{t-1} - INF_{t-1})$	0.209	2.8

$\bar{R}$-Squared = 0.35
Standard Error = 1.1%

Autocorrelation Tests (Lagrange Multiplier)
CHISQ (1) = -0.02, not significant
CHISQ (4) = 1.59, not significant

Parameter Stability (after 1986Q4)
CHISQ (8) = 3.60, not significant

Chow Test (test for structural break after 1973Q4)
F(4,88) = 2.20, not significant

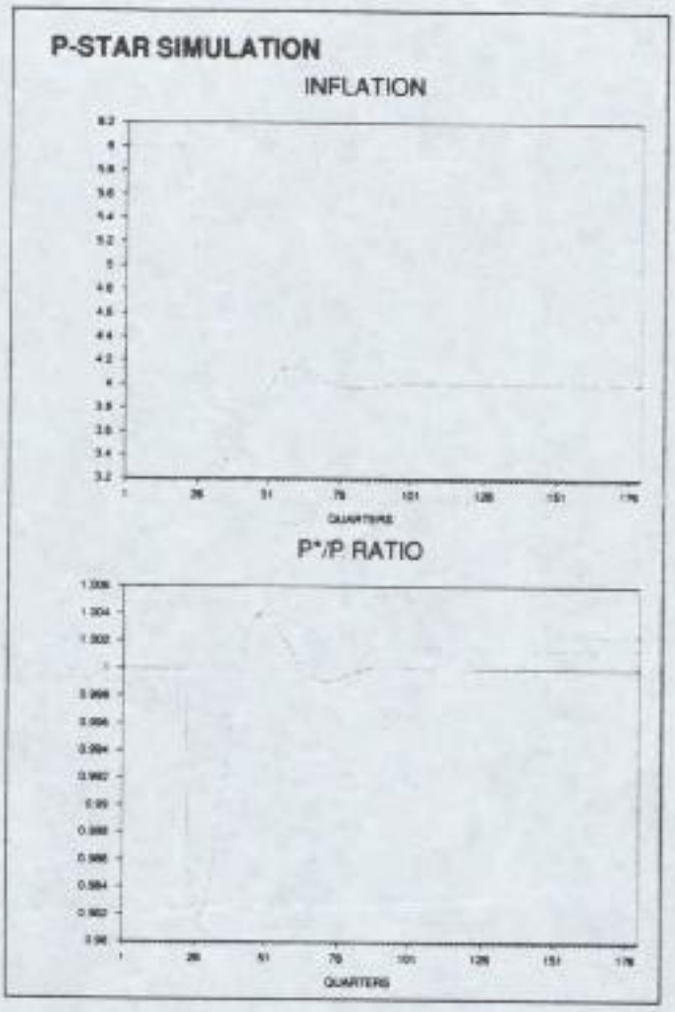
As the results show, the equation has a reasonable "fit" (bearing in mind the dependent variable is defined in changes format), there are no obvious problems with specification, the forecasting properties in the post estimation period are acceptable and there is no clear evidence of a structural break within the estimation period.

The remarkable property of the equation estimated - a finding which concurs with that of the Fed - is how well it performs considering the parsimonious nature of the specification. The equation is effectively just relating the price level to the monetary base. There are no oil price dummies, no fiscal effects, and no prices and incomes policy dummies. Yet, as the reported hypothesis tests show, the equation provides a perfectly adequate representation of inflation history.

The above equation was then examined to test the dynamic response of inflation to a monetary shock. Specifically we set up a steady state in which inflation was 6% and P* = P. We then "shocked" M0 growth downwards by 2% (thus reducing the equilibrium inflation rate to 4%). The purpose of this simulation exercise was to

- check the dynamic stability of our estimated equation
- examine the implied lags in the system between changes in the monetary base and inflation

The results of our simulation exercise are given in the charts below. Clearly the equation is dynamically stable and exhibits cyclical convergence to the new equilibrium



path (this "overshooting" characteristic is fairly typical of the model-type we have estimated). Following the shock to monetary growth (which is large in proportionate terms) it takes around 5 years for the system to settle down (within ½% of the new equilibrium inflation rate). As would be expected the P*/P ratio dips sharply after the monetary contraction before returning (on a heavily damped cycle) to its unit value.

Assessing the current monetary stance

The P-star approach developed above is admittedly simplistic. Certainly there is room for further analysis, sensitivity checks and the like. But the purpose of this paper has been to demonstrate, in a reasonably accessible form, the power of monetary effects in the long-run inflationary process.

P-star, we stress, is not foolproof. Its calculation is sensitive to the assumptions made and is of assistance more in judging long-run forces rather than providing short-run insights. Nevertheless our view, based on the above analysis, is that P-star is a worthy addition to the indicators monitored by the authorities.