BRITISH ECONOMIC POLICY UNDER MARGARET THATCHER: A MIDTERM EXAMINATION

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On May 3, 1979, the "British people...voted for a change"[1]--a change personified by Margaret Thatcher, the leader of the Conservative Party. Thatcher and her party had campaigned on a platform calling, uncharacteristically in British politics, for a radical departure from the status quo. In the macroeconomic area, the platform called for control of the money supply with publicly announced targets, gradual reduction in the government deficit, abandonment of price controls, reduction of government spending and of income taxes, especially at upper and lower incomes where the marginal rates (inclusive of welfare programs) were in the prohibitive range.[2] Since the first two words of the platform's text were "Sound money," Britain under Thatcher has been called a test of monetarism. In this paper we attempt to examine what has actually happened since the election and come to some interim conclusions as to how things have turned out both relative to her campaign promises and to what would otherwise have occurred.

To set the stage for this analysis and in the process to provide a counterfactual for evaluating the Conservative government's performance,

let us briefly review the trends in the British economy over the l two and a half decades. On a secular basis, the U.K., like the U. during this period, has experienced an accelerating rate of inflat rising rate of unemployment and a diminution in the rate of real o growth. Accompanying these developments have been high and rising monetary growth, high and rising interest rates and a substantiall expanded government sector. The difference between Britain and Ame. is that Britain by the mid-1970s clearly appeared to be, as it were, a cycle ahead.

In 1976 at the same time that economic commentators in the United States were beginning to breathe a sigh of relief that the worst was over and one well-known forecaster was heralding the coming bull market in bonds, some of the more jaundiced observers on both sides of the Atlantic were beginning to wonder whether there would indeed always be an England. Simple extrapolation of the deteriorating trend from the mid-1970s on suggested that inflation on a five-year average basis would be roughly 12-14% per year from 1976 to 1980, real growth 1.5-2%, monetary growth 10-12%, and the consol rate 14-15%. Another business contraction, of the 1974-75 variety, perhaps worse, seemed like a reasonable prospect sometime near the end of the decade. Using the same methodology, one would have been led to conclude that the first half of this decade would be worse still.[3] Even the optimists were touting a scenario in which Britain merely muddled along, experiencing neither deterioration nor improvement.

By the time the Thatcher government came into office events were beginning to validate the earlier dire forecasts. Monetary growth had been high and rising for several years. Inflation was obviously

destined to follow and unemployment still stood at 5.5% of the labor force.

In assessing what has happened in Britain since then and in evaluating the policies actually followed, we focus on a number of key areas: the method of conducting monetary policy, the actual course of monetary policy itself, fiscal policy and unemployment. We generally omit consideration of the shift from the Bretton-Woods system to floating exchange rates because in earlier work reported in Darby, Lothian, et al (1983), we found the United Kingdom to pursue a sterilization program which effectively insulated short-run money movements from overseas events even under pegged exchange rates.

II. The Conduct of Monetary Policy

The Bank of England and U.K. Treasury in their March 1980 Green Paper, Monetary Control, present the official view of how monetary policy in Britain operates. At the outset of the paper they list five main instruments of monetary control: "fiscal policy, debt management, administered changes in short-term interest rates, direct controls on the financial system and operations in the foreign exchange markets." The framework which the monetary authorities (the Bank and the Treasury) use in analyzing the effects of these various instruments and in conducting policy itself is an accounting identity derived from a (partial) consolidation of the Bank's and commercial banks' balance sheets.

The change in £M3, the target aggregate, is decomposed within this framework into changes in three asset counterparts and one liability

counterpart. By the balance sheet identity, the change in LM3 equals the public sector borrowing requirement (or PSBR) less sales of government sector debt outside the banking system, plus the change in bank lending to the (domestic) private sector and the overseas sector, plus the net external inflow of funds to the private sector less the increase in banks' non-deposit liabilities. To influence £M3, the authorities manipulate one or several of the policy instruments in an attempt to alter one or more of these asset components of the central bank's and commercial banks' balance sheets.

II.A. Control Procedures

Before we go on to discuss the methods of implementing policy, let us first focus briefly on the underlying accounting identity. Consider, in particular, the first three items: the PSBR, sales of government bonds to the non-bank public and bank lending to the (domestic) private and overseas sectors. Implicit in the consolidation that gives rise to this breakdown is a treatment of the central bank and commercial banks that makes no distinction between their respective monetary liabilities. Treasury obligations bought by commercial banks and by the central bank are viewed identically within this framework; similarly, commercial bank lending to the government is viewed as somehow or other different from commercial bank lending to the non-bank public.

From the standpoint of monetary analysis, neither treatment makes much sense. Purchase of a government security by the Bank of England is, in the first instance, quite different from purchase by a commercial bank.[4] A purchase by the Bank has a high-powered effect on the money supply: it increases bank reserves and the monetary base. A purchase by a commercial bank, in contrast, does neither.[5] Conversely, a loan by

a commercial bank to the government is no different in its monetary effects than a loan by a commercial bank to a firm within the private sector. The only way these categories do make sense is if credit rather than money is the focus of policymakers.

The economic confusion mirrored in the accounting breakdown has an exact parallel in the methods of policy execution. The choice of policy tools and their use again is much more consistent with a credit view than a monetary view.

The control problem, as the Bank of England sees it, is one of influencing the various asset components of £M3. Since fiscal policy is beyond the Bank's purview, the problem, therefore, largely reduces to one of controlling bank lending and net reserve inflows via manipulation of interest rates, intervention of one sort or another in the foreign exchange market and direct controls over bank lending.

The direct controls utilized by the Bank of England in recent years have been in the form of Supplementary Special Deposits--the so-called "corset." Under this scheme, banks that had growth in interest-bearing eligible liabilities in excess of the amount the Bank of England deemed desirable were compelled to maintain special non-interest bearing deposits with the Bank.

This particular type of controls was introduced in 1971 with the enactment of Competition and Credit Control. That set of regulations, in turn, was designed to replace the jerry-built system of separate credit controls then in existence.[6]

The first imposition of the corset was in December 1973 to check the rapid growth in £M3 and credit that had been underway for three years. In that episode, the controls lasted until January 1975.

Reimposition came from December 1976 until June 1977 and then again from June 1978 until June 1980. The rationale in both of the later instances, as in the first, was to stem what the Bank thought to be excessive expansion of credit by commercial banks.

Direct controls on capital account transactions came into existence in Britain during World War I and were reimposed at the start of World War II. They became a fixture of postwar life with the passage of the Exchange Control Act in 1947. Until the late 1960s, the primary motivation for these controls, as well as for the Bank's intervention in the spot and, post-1964, in the forward markets for foreign exchange was the presumed beneficial effects of these actions on the exchange rate and the balance of payments. In the 1970s, both types of policies took on importance in the eyes of policymakers as instruments of monetary and credit control.

The abolition of exchange controls in October 1979 was followed by the removal of the corset in June 1980. Neither was an accident; both were the result of policy moves by the Thatcher government. Viewed from the standpoint of academic discussions of monetary policy or from the standpoint of policy implementation in countries like Germany and Switzerland, or indeed Britain throughout most of her modern history, neither appears monumental. In the postwar British context, however, in which the removal of exchange controls was widely expected to augur a massive depreciation of sterling and in which the idea that interest rates might perform a useful function in equating the demand and supply of credit was treated as quaint, both changes gain considerably in stature.

II.B. A Critical Assessment

In evaluating the conduct of policy in Britain since Prime Minister Thatcher's election, we consider the suspension of both types of direct controls a definite plus. Neither has any positive macroeconomic significance. Rather they were sources of misinformation to economic participants about both prices and the thrust of policy and, for these and other reasons, sources of economic inefficiency.

On the other side of the ledger is what remains of the policy apparatus described in the Green Paper. Interest rates are the primary direct instrument of monetary control. In that document, the monetary authorities describe the separate effects of changes in interest rates on the various accounting counterparts to £M3. They conclude, after pointing out the difficulties of judging some of these separate influences, that increases in interest rates, on net, will decrease the asset counterparts and hence produce a decrease or smaller-than-otherwise increase in £M3. The presumption here apparently is that the effects of changes in interest rates on bank lending to the private sector will dominate any offsetting effect on the other asset components of £M3.

We view the concentration on interest rates both as major indicators and as major instruments of monetary policy as essentially flawed in any context. In the British situation, the peculiar accounting identity that serves as an intermediate step in the process adds to the problem appreciably.

The Federal Reserve in the United States has frequently relied on a money demand function to estimate an interest rate--in the last decade, in particular, the federal funds rate--consistent with its monetary

target.[7] It then tried to achieve that target by manipulating that rate via open market operations. The dangers of cumulative overshooting or undershooting inherent in that procedure are well known (Friedman and Schwartz, 1963; Brunner and Meltzer, 1964). Even that procedure, however, was preferable to current British practice.

The Federal Reserve typically chose some level of the federal funds rate consistent with the level of its target for the nominal stock of money. It then attempted to peg the funds rate at that level via open market operations. The funds rate target itself came from a money demand function that we can write in simple form as

$$(1) \quad \Delta i_{ft} = \frac{\alpha_1 \Delta Y_t - \Delta M_t}{\alpha_2}$$

where i_f is the federal funds rate, Y the estimated level of nominal income and M the target level of money and a Δ signifies a rate of change. If there are shocks e_Y to nominal income and errors e_M in the demand for money function this expression becomes

$$(2) \quad \Delta i_{ft} = \frac{\alpha_1(\Delta Y_t + e_Y) - \Delta M_t + e_M}{\alpha_2}$$

If these errors are not pure white noise, or if the forecasts of Y are subject to a systematic error, the stock of money will deviate from its target path until the interest rate target is changed to take account of both the initial shock and its subsequent effect on Y (Brunner and Meltzer, 1980).

The Bank of England's focus on bank lending rather than on money introduces two additional sources of error in the monetary control procedure: one is on the side of the demand for money, the other on the side of the supply.

We can illustrate the demand problem in terms of an equation similar to (2). Bank lending to the (domestic) private sector and the overseas sector, when viewed in monetary terms, that is, from the liability side of the consolidated balance sheet of the monetary authorities and commercial banks, is the difference between M and the base, B. We will call this net fiduciary money, N. We can write a demand function for N in exactly analogous form to the demand function for M:

$$(3) \quad \Delta i = \frac{\beta_1(\Delta Y + e_Y) - \Delta N + e_N}{\beta_2}$$

The shocks to income are the same as in (2). What differs is the error term in the demand function, e_N rather than e_M. If M is indeed the correct definition of money, e_M is presumably smaller than e_N. Shocks that only affect the relative proportions in which individuals want to hold B and N will cancel out for M but not for N. The Bank's procedure, in this instance will produce greater instability in M than would have occurred had they adopted the Federal Reserve's traditional procedure.

Alternatively, suppose B is more stable in demand than M. No useful purpose will be served by attempting to control N. In fact, it will most likely prove counterproductive. Trying to control the base itself, even through the medium of interest rates would be preferable.

A further problem inherent in this control procedure is that is introduces an unnecessary lag and hence short-run instability into the money supply process. To illustrate, suppose that the government deficit increases. Increased bond sales can only take place at lower bond prices and higher yields than previously. If the Bank is unwilling to let interest rates rise it will buy bonds, as a result increasing the

monetary base. That, in turn, will lead to increases in bank lending. At that point a reduction in the monetary base follows, as the Bank sells bonds in an effort to drive interest rates up and thereby reduce bank lending. Under ideal conditions, the final equilibrium will be the same as that which would have prevailed had the Bank not engaged in interest- rate stabilization and controlled the base at the outset. The short-term paths of money and credit will, however, differ. We see no reason to expect the greater fluctuations in both under the Bank's current operating procedure to have a neutral impact on the rest of the economy.

II.C. Monetary-Base Control

In our view, the optimum policy for the Bank of England to follow would be to control the monetary base directly via open market operations.[8] The base in turn could be either the instrument for controlling some broader monetary aggregate or the ultimate targeted aggregate itself.

Until the past two years, such base control appears to have been given absolutely no consideration whatsoever, either in Whitehall or on Threadneedle Street. To its credit, the Thatcher government has initiated debate on the subject. So far, however, that discussion has resulted in little substantive change in the conduct of policy.[9]

The response by the Bank and the Treasury is contained in the March 1980 Green Paper. In it, they consider two variants of a base-oriented system, one without mandatory reserve requirements; the other with such requirements. With respect to the first they conclude (p. 9): "...given the known costs and uncertain benefits...the case for a scheme on this basis has not been made out." With respect to the second, they

say (p. 11). "These [practical operational] difficulties... are such that we doubt whether a monetary base control system with a mandatory requirement to hold base assets would produce the desired results."

The reasoning behind these statements by the authorities is their belief that the money multiplier is too variable for such a procedure to be efficacious and that even if the multiplier were not highly variable, interest rates under a system of base control would prove overly volatile.

The issue of interest-rate variability is difficult to resolve convincingly before the fact. We believe that the question is not variability per se but the time period over which the variability of interest rates occurs and the maturity of the financial instruments that are most greatly affected.

On a day-to-day or week-to-week basis, rates on short-term instruments are liable to be more variable under a system of base control. Over periods ranging from several quarters to several years, we suspect that the opposite is the case. Deviations in monetary growth away from target will be both less pronounced and less protracted than under a regime in which the authorities attempt to stabilize interest rates. Other things being equal, short-term rates will, therefore, fluctuate less and intermediate and long-term rates, barely fluctuate at all. The only increased variability one is apt to see over these longer time horizons is in the slope of the yield curve and even that is far from clear. As evidence in favor of this view, we cite the behavior of interest rates--both short and long--prior to World War II in Britain. On a yearly basis, bond yields varied virtually not at all; treasury bill yields by far less than during the past two and a half decades.[10]

Underlying the authorities belief that the money multiplier is highly variable particularly under a system of voluntary reserve requirements, is a failure to make two crucial and highly related distinctions: between the banking system as a whole and an individual bank; and between the actions of the banking system under a regime in which the central bank actively engages in short-term stabilization of interest rates and one in which they do not.

To each individual bank the source of reserves in the first instance is irrelevant: acquiring reserves via sales of securities to the central bank is the same as acquiring them via the interbank market. For the system as a whole, the interbank market cancels out. What matters is the quantity of reserves available relative to the desired quantity. No amount of "liability management" by banks can right a reserve deficiency for the system. Adjustments on the asset side of individual bank's books and hence on the liability side for the system as a whole are the only recourse.

The reason that such adjustments are usually considered as afterthoughts by commercial bankers, even in the United States where required reserves exist, and the reason for the British authorities confusion on the subject is that central banks generally react to incipient reserve deficiencies for the system as a whole.[11] In any one statement period they supply the reserves that banks' desire at interest rates that are generally close to those initially prevailing in the market. Only through time do they slow reserve growth, and are interest rates pushed up and bank assets altered.

Empirical evidence for Britain on the question of the multiplier's stability is exceedingly thin: the monetary authorities present none in

the Green Paper and few outside scholars have examined the money multiplier relationship in Britain.[12] Our own very limited investigation, unfortunately, is subject to widely differing interpretations.

On the surface, the data appear to support the authorities' extreme reservations about the efficacy of base control. In Table 1 we present the standard deviations of the annualized logarithmic changes in the ratios of M1, £M3 and what we call M2 (£M3 less CD's and central government deposits) to the monetary base. For both quarterly and annual averages of the quarterly data, these show a high degree of variability in the three multipliers. Only for data averaged over quinquennia does this variability diminish drastically and the relationships between the base and the broader aggregates become appreciably more stable.

We suspect, however, that these summary statistics are telling us more about the effects of a monetary control procedures, such as the corset, that explicitly aim to influence the money multiplier than the behavior of the multiplier in the absence of such a procedure. More important, as we show in the next section of the paper, the monetary base in Britain is currently the "best"predictor--in the sense both of goodness of fit and satisfication of a priori theoretical constraints--of the price level and nominal income. The fact that it outperforms broader aggregates, which one would ordinarily prefer as definitions of money is consistent with our interpretation of the behavior of the various money multipliers. Furthermore, it suggests that regardless of the factors influencing the various multipliers, control of the base is a requisite for controlling nominal income growth and inflation.[13]

III. Money and the Economy

More important than how monetary policy has been conducted is to what effect. Has monetary policy since the election of the Tory government become less inflationary? Has there been a monetary shock that has impinged on the real side of the economy? And if the answers to both questions are "yes," how can we reconcile that with the relatively high rates of growth of £M3, the aggregate that the Bank of England targets? These are the questions to which we now turn.

III.A. The Definition of Money and Recent Policy

The conundrum is whether or not monetary policy has become restrictive. As Table 2 indicates, different definitions of money tell quite different stories. From the start of the second quarter of 1979 to the end of the fourth quarter of 1981, £M3 has growth at a 12.8% annual rate, a scant .2 of a percentage point below its average annual rate of increase during the prior eight quarters. Both M1 and the base, in contrast, have undergone dramatic decelerations: M1 from 16.9% in 1977:I-1979:I to 4.7% in 1979:I-1981:IV; the base from 13.9% in the first period to 5.8% in the second.

Adding to the problem of interpreting the course of policy are movements in deposit interest rates and several special factors that have affected some and perhaps all of the aggregates during the past two years, but £M3 in particular.

One of these was the reimposition of the corset in June 1978. Banks soon found at least a partial way around these restrictions, matching ultimate lender and ultimate borrower in more direct fashion, using the market for banker's acceptances instead of issuing CDs and making

standard commercial loans with the proceeds. The rate of growth of CDs, therefore, fell and in the process depressed the growth rate of £M3. When the corset was lifted the reverse took place. The end result is that from mid-1978 until mid-1980, the rate of growth of actual £M3 understated the rate of growth of a homogeneous aggregate and for some time thereafter, overstated it.

Compounding the problem of interpretation further was the civil servants' strike in the summer of 1981. Payments of taxes were interrupted and with it the normal flow from private to government deposits. The most likely effect was an overstated increase in the rates of growth of both £M3 and M1 during that period and an understated decrease in their rates of growth thereafter.

All of these potential problems of the interrelation between the supply of and demand for money notwithstanding, much of the popular discussion of monetary policy in Britain has been couched in terms of £M3. Commentators who follow this approach view it as proof positive that the government's monetary policy has failed and that inflation will once again accelerate in late 1982 or 1983. A number of scholars who have studied the question concur. Roy Batchelor and Brian Griffiths (1981), for example, reach this conclusion in a recent paper in which they compare the predictive ability of the base, M1, £M3, and two broader aggregates in explaining inflation and nominal income growth. We have performed a battery of tests similar to their's but reach the opposite conclusion.

To conduct these tests we ran a series of distributed lag regressions of the form

$$(4) \quad \Gamma_j Z = \sum_{i=0}^{n/j} b_i \Gamma_j M_{-ij} - \gamma + \varepsilon$$

where Z was alternately, nominal (expenditure-based) GDP, the corresponding GDP deflator and the retail price index; M was alternately the monetary base, M1, M2 and ±M3; Γ_j is the growth-rate operator, γ is a trend term and ϵ the error term. In these regressions, j took on the value 1 (for simple quarter-to-quarter movements) and 4 (for fourth-quarter to fourth-quarter annual movements); n was defined variously.

In each instance we ran the regressions using a variety of lag structures and for two sample periods, 1960:II to 1980:IV and 1968:II to 1980:IV. The starting date for the first was dictated by the maximum lag length and the availability of data.[14] We chose the starting date for the second to maintain somewhat greater comparability with Bachelor and Griffiths. This shorter period has the further advantage that it is apt to have been more heavily dominated by the special factors to which we have already alluded. It thus may provide a better testing ground for our evaluation of recent policy.

Table 3 contains the $\bar{R}^2$'s from these regressions. For the longer period, the two broader aggregates, M2 and ±M3, generally produce slightly superior fits to those for the base and M1 for all three dependent variables and in both the quarterly and the annual regressions. On the basis of this evidence it is tempting to conclude that ±M3, or perhaps M2, is the best monetary indicator.

That apparent superiority of ±M3 over the base, however, does not hold up under closer scrutiny. In the regressions for the shorter period, the $\bar{R}^2$'s for the base are generally higher than those for ±M3. Viewed from the standpoint of those who favor ±M3, these measures of goodness of fit are at best moot on the question of how to define money.

And if one places a greater weight on the more recent period, they come out slightly in favor of the base over ±M3.

What tips the scales to a much greater degree towards the base are the patterns of coefficients in the various regressions. Those for ±M3 make little theoretical sense while those for the base correspond closely to a priori expectations. To see what we mean, a simple example may prove helpful.

Consider for a moment a situation in which monetary growth undergoes a permanent but unexpected increase of one percentage point. In the transition to the new equilibrium inflation will initially increase by less than that amount and then for some time thereafter by more. During the first of these two stages, the ratio of the price level to the nominal stock of money will be falling relative to trend; during the second it will be rising. When full equilibrium is reached, the rate of inflation will be one percentage point higher and the ratio of the price level to the nominal stock of money, other things equal, will be constant at either a higher level or, in the case of superneutrality, the same level that would have existed prior to the monetary acceleration.

The point can be expressed directly in a simplified version of equation (4) with j=1 omitted:

$$(4a) \quad \Gamma P_t = \sum_{i=0}^{n} b_i \, \Gamma M_{t-i} - \gamma + \varepsilon_t$$

The implied effect on the growth rate of $\log (P/M)_t$ of a .1 percent (0.01) unexpected increase in ΓM beginning at quarter 0 is $0.01 \sum_{i=0}^{t} b_i - 0.01$ since the first term is the induced increase in ΓP_t from a 0.01 increase in ΓM_t [$\Gamma(P/M)_t \equiv \Gamma P_t - \Gamma M_t$]. The effect on the <u>level</u> of

$\log (P/M)_t$ is the sum from 0 to t of these effects on the growth rates which can be written as

$$-0.01 \sum_{k=0}^{t} (1 - \sum_{i=0}^{b} b_i)$$

Since $\log (P/M)_t$ should in the long run either increase or, in the superneutrality case, be unchanged, we require

$$\sum_{k=0}^{t} (1 - \sum_{i=0}^{k} b_i) \leq 0$$

If Σb_i rises smoothly over time to 1 this condition is not met and we get the nonsense result that an increased inflation rate reduced P relative to M. See Darby (1979) for a theoretical discussion of the requirement that ΓP overshoot its long run value during the adjustment to an increased ΓM.

As we have already stated, the regression coefficients for the base generally behave in this fashion while those for £M3 do not. The retail price equations which we present in Table 4 are particular examples of this general phenomenon. In the base equation, the sum of the coefficients for base growth reach unity after six quarters, peak at 2.15 after eleven quarters and then fell back to unity, and then below, after sixteen quarters.[15] Undershooting of the equilibrium rate of inflation is followed by overshooting following an increase in base growth. Thus, there is a tendency towards equilibrium in both the rate of change and in the level of retail prices. In the £M3 equation, in contrast, the sums of the coefficients are slightly below zero after six quarters and only approach unity after fourteen quarters have elapsed. Since at no time do they exceed unity, undershooting of inflation is never followed by overshooting. The end result is a movement towards

equilibrium in the rate of change but not in the level of prices. The ratio of the retail price index to £M3, therefore, permanently decreases when the rate of £M3 growth permanently increases.

To illustrate the difference between the two aggregates more forcefully, we have rerun the nominal income equations as velocity equations. In these equations, the logarithmic rate of change of the velocity of the respective monetary total is the dependent variable and current and lagged values of its logarithmic rate of change are the independent variables. The results of these regressions are reported in Table 5. The £M3 regressions again are extremely poor. The initial decrease in £M3 velocity following an increase in monetary growth is never reversed. The coefficients are negative throughout suggesting the theoretically perverse conclusion that an increase in monetary growth will permanently decrease the rate of growth of £M3 velocity.

The base regressions in contrast show the expected pattern of coefficients: negative followed by positive. And in the regression for the shorter period, the sum of the positive coefficients is slightly greater in absolute value than those of the negative coefficient. An increase in the rate of base growth, according to these estimates, initially depresses the level of velocity but ultimately raises it. In equilibrium, however, the rate of change of velocity remains unaffected.[16]

We suspect, therefore, that what the £M3 price and nominal income equations are capturing is the influence of changes in deposit interest rates as well as the effects of Competition and Credit Controls and the corset. All three are likely to have induced a depressing effect on velocity, or the ratio of the price level to the nominal stock of £M3 in

periods of monetary ease and the reverse in periods of monetary tightness.[17] Specification bias of this sort would explain why our equations imply permanent decreases in both following a permanent increase in £M3 growth.

Consistent with this interpretation are the differences in the relative rankings of £M3 and the base in the short and the full sample period and the fact that the £M3 regressions show only a very small influence of £M3 on the other variables in the first year or two. The short period presumably was more heavily dominated by special factors and changes in the relative costs of holding different monetary assets than the full period. Similarly, the relatively long lag before a change in the rate of £M3 growth has any appreciable effect on inflation or nominal income growth is what one would expect to find if the special factors were themselves linked to developments a phase earlier.

The conclusion we reach from this analysis is that the monetary base currently provides the best indication of monetary pressures on the price level and nominal income in the British economy. As a result of changes in regulations, direct controls and high and variable interest rates, broader monetary aggregates like £M3 and also M1 appear to have been rendered less stable in demand than the base. The removal of the corset in 1980 is just a further example of the same phenomenon. There is no reason to expect it to prove any less destabilizing. The base, therefore, seems to us to be the best of the alternative indicators that we have compared.

We realize that this judgement runs largely counter to most modern monetary analysis in which money is defined in terms of one or the other deposit-inclusive monetary total. In the British context in which

Radcliffe, with its emphasis on overall liquidity, retains a powerful hold intellectually, this is especially so. Using the base as the empirical definition of money, or what amounts to the same thing, as an index of some broader definition of money, is, however, not without precedent. In other contexts in which inflation is high and variable and regulations such as interest-rate ceilings and direct controls are imposed on banks, the stability of deposit-inclusive definitions of money in demand can be drastically reduced relative to that of the base. In such instances, the base by default becomes the most empirically useful definition of money (Friedman and Schwartz, 1970; Lothian, 1976).

If we are correct--and the proverbial pudding will be available for the reader's eating about the time this paper is published--inflation in 1982 and 1983 will be low and falling in Britain in line with the reduced rate of growth in the monetary base in 1980 and 1981 and counter to the prognostications of those who rely on recorded £M3 as an indicator.

III.B. Money and Interest Rates

Evidence supporting this conclusion is provided by the behavior of interest rates. The time pattern of their movements is consistent with the notion that monetary policy indeed turned restrictive and that the economy was subject to a substantial shock.

Base growth in Britain decreased in several steps: from an average of 13.9% per year in 1977:I to 1979:I to 9.9% per year in the remaining three quarters of 1979, to 4.2% per year in the four quarters of 1980. Short-term interest rates, as epitomized by the three-month local authority rate, rose progressively until the first quarter of 1980. On a last month of the quarter basis, the increase was close to six

percentage points, from 12.2% at the end of 1979:I to 18.4% at the end of 1980:I.

Using the actual rate of retail price inflation over the following three months as a measure of the expected rate of inflation we have derived a corresponding series for the real interest rate. The time pattern differs from that of nominal rates--mid-1980 is the apparent peak--but the story is the same: a substantial increase took place, ranging from five to ten percentage points depending upon the period chosen.

We believe that these increases in the U.K. real interest rate relative to the U.S. real interest rate occurred due to the U.K. money shock and explain the appreciation of the pound relative to the dollar from the second quarter of 1979 until early 1981 when a similar restrictive policy took effect in the United States. Unemployment rate movements, which we analyze below in section V, provide further corroborative evidence of a monetary shock.

IV. The Budget and the PSBR

In contrast to the many shoulders upon which we could stand in our analysis of monetary policy, Thatcher's fiscal policy has been nearly undiscussed. The prevailing view seems to be that nothing much as been going on except that the deficit or Public Sector Borrowing Requirement (PSBR) has grown yet larger. While popular opinion usually has a basis in fact, we believe that concern about the PSBR is misplaced as discussed immediately below. We then turn to an examination of the

macroeconomic implications of the shift from income to expenditure taxes.

IV.A. The Budgetary Implications of Ending an Inflation

Perhaps the greatest obstacle to the consistent and persistent application of monetary restraint to end an inflation is concern over budget deficits and their financing. This conflict has many variations but the central theme is that the central bank must finance at least part of the deficit or government borrowing will crowd-out private borrowing via an unacceptable increase in the (real) interest rate. This reasoning underlies the Bank of England's concern but the Public Sector Borrowing Requirement, but similar arguments have been proffered by various officials of the Federal Reserve System. We believe that this argument is flawed in a number of ways, but here concentrate on two: The deficit (PSBR) is primarily the result, not the cause, of the central bank's penchant for rapid money growth; and a temporary increase in the deficit is an unavoidable side-effect of the restrictive monetary policy.

The biases in standard national income accounting measures of the government deficit and private saving have been reported for some time, but like most such issues have not been widely appreciated in the profession.[18] The main source of the bias is that a portion of the nominal interest payments of the government represent a return of capital and not economic income to the lender nor expense to the government. Nonetheless national income accounts include this compensation for decline in the real value of debt as an expense to the government and as income to the private sector. Given rationality on the part of the public, consumption will not be affected and reported

saving will be overstated by the same amount as the government deficit.[19]

A similar, but more controversial, bias arises from not counting the decline in value of base money as a tax: Again the deficit, private income, and private saving are all overstated by the same amount. To make these adjustments, however, we are implicitly moving the revenues from money creation (both seignorage and inflation tax) above the line and out of the deficit. Rather than get involved in a substantial digression to resolve this issue, we shall limit our discussion to the bias due to the inflation premium in nominal interest rates.

Analysis of the government budget constraint will clarify the issues. On conventional accounting definitions, the deficit is the rate of increase in the nominal value of base money and net government debt held by the public, $\Delta B + \Delta D$. Government expenditures are for goods and services at the rate G and for nominal interest on the government debt $R \cdot D$. Revenues are taxes (net transfers) on income and on government interest payments (assumed proportional for simplicity), $\tau(Y+R \cdot D)$:

$$(5) \quad \Delta B + \Delta D \equiv G + R \cdot D - \tau(Y+R \cdot D)$$

In full equilibrium, the nominal interest rate on taxable debt is

$$(6) \quad R = r + \frac{\Gamma P}{1-\tau}$$

where r is the nominal interest rate if the inflation rate is zero and ΓP is the rate of inflation.[20] Substitution reveals that the national income accountant's measure of the deficit is

$$(7) \quad \Delta B + \Delta D = G - \tau Y + (1-\tau) r D + \Gamma P \cdot D$$

Note, however, that nominal borrowing ΔD is the sum of the nominal value of real borrowing ($P\Delta d$) and the increase required to offset inflation $\Gamma P \cdot D$ where P is the price level and lower case letters represent real values. Therefore, the accountant's measure of nominal borrowing included in the deficit overstates the nominal value of real borrowing by $\Gamma P \cdot D$ due to the inflation premium in government debt payments.

Cagan properly points out that when we are not in full equilibrium, it will be improper to assume identity of the actual and expected inflation rates. This is not a major issue to the extent that the government debt consists of short-term bills, but where longer term bonds and consols exist as in the British case there will be substantial capital losses to taxpayers as a whole and gains to bond and consol holders if the government eliminates an established inflation without first refunding the long-term debt into demand or indexed form. We can only refer here to the work of Barro (1974) and Kochin (1974) as providing some justification for supposing that the aggregate effects of such redistribution are negligible. Even neglecting any redistributive effects, however, to the extent that longer-term fixed interest bonds are outstanding, $\Gamma P \cdot D$ will be an over-estimate of the accounting bias due to inflation.

It is convenient to examine the deflated accounting deficit which corresponds to the PSBR in 1975 pounds:

$$(8) \quad \frac{\Delta B + \Delta D}{P} = g - \tau y + (1-\tau) r d + \Gamma P \cdot d$$

The immediate effect of restrictive monetary policy is to enlarge this accounting deficit temporarily decreasing real output y and hence total taxes less transfers and perhaps, temporarily by increasing the real

interest rate r. The long-run effect is just the opposite: as inflation and interest rates fall the $\Gamma P \cdot d$ bias is reduced or eliminated. If government spending and tax rates are at appropriate levels for a noninflationary environment, we see no purpose in changing them to avoid the deficit associated with either the recession or the accounting bias. The most effective way to reduce the PSBR (or interest rates) is to pursue faithfully a slow-money-growth policy even if it requires a temporary increase in the PSBR (interest rates). It is wrong in precisely the same way for central bankers to wait until the deficit is decreased before money growth is slowed as to wait until nominal interest rates fall. Both are primarily the result, not the cause, of an inflationary monetary policy.

Alternative measures of the PSBR are presented in Table 7 for 1970-1980 together with comparative data back to 1955 at five year intervals. The nominal PSBR is for the calendar year.[21] The government sector net nominal interest payments are provided to illustrate how important they have been in accounting for the secular increase in deficit. The deflated PSBR is obtained by dividing by the GDP deflator to convert the nominal deficit into constant pounds. The real PSBR subtracts from the deflated PSBR the year's GDP inflation rate times the estimates real government debt outstanding as of June 30th. The estimated real government debt is also reported in the table. Table 8 reports the same figures measured as a fraction of GDP.

Concentrating on Table 7, we see that the secular increase in the nominal PSBR closely parallels the increase in net nominal interest payments by the government. The deflated PSBR became substantial during the 1970s, but this increase was attributable to the inflation premium

on the government debt. Indeed the real PSBR indicates a generally substantial surplus due to the incomplete adjustment to inflation of the average interest rate paid.[22] An alternative way of making the point is that nominal borrowing was generally smaller than the loss in the real value of government debt outstanding.

If the growth in the deficit is to be understood as primarily an accounting phenomenon, what can be said about government spending on final goods and services? The Thatcher government has not had much detectable effect here: As shown in Table 9, the first full year of the new government resulted in an increase in spending for final government consumption at very nearly the trend growth rate.[23] Only government capital spending was reduced sharply relative to an already substantial rate of decline. We cannot look for substantial macroeconomic effects here, and so turn to an analysis of tax policy.

IV.B. Effects of the Taxation Shift on Aggregate Supply and Demand

The major fiscal policy shift announced in Chancellor of the Exchequer Sir Geoffrey Howe's Budget speech of June 12, 1979, was a substantial reduction in income taxes offset by an approximately equal increase in value-added taxes (VAT).[24] This change has been viewed as little more than window dressing with at best minor long-run supply effects and no substantial demand effects. Writers of the mark-up school would nonetheless argue that the switch as inflationary because wages would not go down while prices will go up to reflect the increased tax.[25] In this subsection, we shall argue that this shift may indeed have had profound effects by lowering the equilibrium nominal wage associated with any given price level and by lowering the equilibrium price level.

Assume for simplicity that real output (GDP) denoted q here is proportional to factor input ℓ:

(9) $q = \lambda \ell$

If W is the nominal factor price, then the market price of output is

(10) $P = \frac{W}{\lambda}(1+\alpha)$

where α is the fraction of total factor cost collected as VAT. This equation can be solved for the equilibrium factor price

(11) $W = \frac{\lambda}{1+\alpha} P$

We conclude that in equilibrium an increase in the VAT rate α will decrease wage rates and other factor prices relative to market prices, but whether W falls, P rises, or what happens remains to be seen.

Taxable real national income is $\ell W/P = q/(1+\alpha)$. If τ is the income tax rate, private (after tax) real income Y is given by

(12) $y = \frac{1-\tau}{1+\alpha} q$

Here we are dealing with decrease in τ which offset the increases in such that total taxes and $\frac{1-\tau}{1+\alpha}$ are unchanged. Thus equilibrium real private income is unchanged since the increase in the fraction of taxable factor income received offsets the increase in final-goods prices relative to factor prices. Supply-side advocates hypothesize that the saving-income ratio is significantly positively interest elastic so that a shift from income to consumption taxation would stimulate saving and, hence, increase input ℓ and output q. We abstract for now from any such eventual effects.

The equilibrium price level P^e is that which equates the nominal money supply M^s with real money demand m^d when converted into the same units

$$(13) \quad M^s = m^d P^e$$

$$(14) \quad P^e = \frac{M^s}{m^d}$$

Our analysis procedes conditionally upon the nominal money supply, so we are concerned with whether the tax shift would affect the real quantity of money demanded. Since the shift changed neither real gross output q nor real after-tax private income y, it appears that m^d and hence the equilibrium price level is unchanged. Nonetheless, since factor prices must fall to reach equilibrium the shift may well have temporarily adverse effects on employment, particularly when we are considering a 3½% drop in equilibrium nominal wages. It may be objected that rational individuals would infer the change in equilibrium factor prices, but we note that the Chancellor of the Exchequer expected prices to rise despite a renewed commitment to preestablished targets for nominal money.

As mentioned above, the tax shift induces an increase in equilibrium after-tax interest rates. Initially this may decrease the demand for money by increasing the net return on alternative assets. While this would induce some rise in the equilibrium price level and hence reduce the fall in equilibrium nominal wages, we find it implausible that this effect is empirically important. Others do find it plausible that higher after-tax real interest rates will significantly increase saving although that effect is theoretically

ambiguous in sign and empirically disputed. If this effect occurs over time, it would increase money demand and reduce the price level ceteris paribus but presumably this factor progresses too slowly to exert a major influence on either output or inflation.[26]

Figure 1 provides a simple means of summarizing the macroeconomic impact of the tax shift. The curves labeled S and D are the pre-shift aggregate supply and demand curves, respectively. Their intersection determines the price level and output within the short period as P and q. To the extent that (taxable) nominal wage expectations do not fall by the amount of the tax shift, the aggregate supply curve is shifted upward to S'. This tends in the short period to reduce output and increase the price level although both the shift and its effects are eliminated in the long run when the actual and expected factor prices adjust to their new lower levels and S' shifts back to S. If the interest-rate effect on money demand were significant, D would shift up and eventually S' would shift down only far enough to intersect this higher D' at the original q. The saving effect, on the other hand, would shift S to the right over time so that q would rise and P fall ceteris paribus.

We believe that the temporary shift in the aggregate supply curve was a significant factor at least in the first year of the Thatcher government. We are considerably more skeptical of the empirical significance of either the aggregate demand or aggregate supply effect associated with increased after-tax interest rates.

V. Why Is Unemployment So High?

Despite the marked progress against inflation, the Thatcher Government's popularity waned as the unemployment rate grew and grew--exceeding 11% of the labor force by the end of 1981. This section confronts the question of whether or not unemployment increases of such magnitudes are the inevitable result of ending an established inflation by reducing the money-supply growth rate. We approach this question in two steps: First we ask to what extent have nonmonetary factors accounted for increased unemployment; next we attempt to identify any special factors that make British unemployment unusually sensitive to restrictive monetary policy. We then present estimates of an unemployment-rate equation.

V.A. Nonmonetary Factors Increasing Unemployment

A sizeable number of nonmonetary factors have been identified which have tended to increase unemployment: North Sea oil production, industrial restructuring, excessive 1979 inventories, the tax switch, the reduction in the predictability of inflation, and factors affecting job search and labor mobility.

North Sea Oil

Production of North Sea Oil increased by some 50% in 1979 over 1978 and by another 15% between then and 1981. Corden (1981) and others have argued that bringing these discoveries into production will tend to appreciate the exchange rate and reduce output of other, traditional, tradeable goods. This sets into motion a reallocation of factors of production to the oil industry and to nontradeable goods. These

reallocations will increase the unemployment rate during the transition period which unfortunately coincides with the Thatcher Government.

Niehans (1981) argues, however, that the resulting decrease in quantity of imported oil has been very nearly offset by the 1979-1980 increase in world oil prices so that the net effect on the balance of trade is minimal. He concludes that the major cause of sterling appreciation and the resulting tradeables dislocations is overshooting of the exchange rate in response to a restrictive monetary policy. Batchelor and Griffiths (1981) argue that North Sea oil attracts capital flows because it insulates the pound from oil-price effects, but this effect too is difficult to support empirically, especially as the pound fell from over $2.40 in October 1980 to about $1.80 in March 1982. We conclude that restrictive monetary policies in the U.K. appreciated the pound relative to the dollar and that this appreciation disappeared as time passed and as the U.S. adopted its own more restrictive monetary policy. Thus, the adverse effects on unemployment of pound appreciation must be assigned primarily to monetary factors.

Industrial Restructuring

Minford and Peel (1981) and Laidler (1981) among others have suggested that a mjaor reallocation of resources has been necessitated by a phasing out of a policy of subsidization of failing firms through the National Enterprise Board and other means. We have found no quantitative measure of this effect and can only list it as possibly important.

Excessive 1979 Inventories

Batchelor and Griffiths (1981) because they rely on the £M3 definition of money, deny the presence of monetary restriction. Their

analysis in this regard has been dealt with above, but we note here that they argue that much of the recession was due to excessive inventories as producers delayed sales until after the collapse of the previous Government's price controls. Obviously this factor could not still be important, but might have temporarily increased unemployment.

Unpredictability of Inflation

The idea that unpredictable rates of inflation will affect the rate of growth of permanent income and with it the natural rate of unemployment is traceable to the work of Harberger (1964) on Latin American economies. Friedman, in his Nobel Lecture (1977) pursued the same theme in connection with the secular decrease in real growth in most industrial nations from the early 1960s on. Both Batchelor (1981) and Attfield et al (1981) have applied this notion to Britain in equations explaining unemployment and real income respectively.

As Batchelor points out, however, and as perusal of alternative measures of inflation unpredictability also indicates, there are few degrees of freedom available to the researcher in these data. The variation in Batchelor's series, for example, is almost all between three successive steps: the first of these begins at the start of his sample period and ends in the late 1960s, the second ends in 1973, and the third continues through 1981. While this variable may explain the apparently higher natural rate of unemployment post-1973, it is incapable of explaining any difference between the recession of the mid-1970s in Britain and the current one.

Cost of Search and Labor Mobility

The increase in unemployment benefits during the last fifteen years in Britain appears to be a major factor behind the apparent upward trend

in the natural rate (Miller and Wood, 1982). The replacement ratio--the ratio of average benefits to after tax earnings--rose by 80% between the early 1960s and its peak in 1971, thereafter declined slightly before rising again between 1978 and 1981. Like the degree of unpredictability of inflation, therefore, these data contain few independent observations: in this instance a time trend captures most of the variation in the series. Because there may be an adjustment period involved before workers take advantage of such benefits, this variable could conceivably explain the higher average natural rate in 1979-81. It would be impossible, however, from the time series data alone to reject the hypothesis that the replacement ratio had nothing to do with that increase.

A potentially important influence on labor mobility is the prevalence of local council housing and the spread of rent controls in the 1970s (Brittan, 1981; Miller and Wood, 1982). Both have some effect on the time that unemployed workers spend out of the labor force searching for new jobs. That, in turn, would increase the average level of the natural rate and perhaps also the sensitivity of unemployment to shocks. Aside from positing such directions of influence we see no way of assessing the quantitative impact from aggregate time-series data alone.

The Tax Shift

The one nonmonetary factor which we try to evaluate is the decline in the equilibrium nominal wage associated with any price level due to the shift from income taxes to VAT. If we view the 3½% shift in nominal wages as equivalent to an equal unexpected decrease in prices, this would account, based upon Batchelor's (1981) results, for about a 1%

increase in the unemployment rate. In the simulations that we perform with our own equation, which differs from Batchelor's in the type of domestic shocks used (monetary in ours; price in his), the effect is somewhat less.

V.B. Empirical Analysis of Unemployment

The equation we use to evaluate the effects of monetary restriction on unemployment is derived from the unemployment-rate analogue of the Barro-Lucas real-income equation:

$$(15) \quad U_t - U_t^* = \alpha + \beta(U_{t-1} - U_{t-1}^*) + S\pi + \varepsilon_t$$

where U is the actual rate of unemployment, U* the natural rate, S is a vector of current (and perhaps lagged) shock variables, α and β are scalar coefficients, π is a vector of coefficients and ε is the error term.

Since the natural rate of unemployment is an unobservable variable, we need to make some assumptions about the process determining it, if (15) is to prove empirically useful. One procedure would be to relate U* to some subset of the variables discussed above. Given the relatively few independent observations available in the time-series data and the collinear nature of many of these variables, we decided to adopt a simpler but more empirically tractable alternative.

We assume that U* can be divided into two components, a deterministic component $\hat{U}^*$ and the deviations of U* from $\hat{U}^*$. We assume further that

$$(16) \quad \hat{U}_t^* = \gamma + \delta t$$

and that

$$(17)\quad U^*_t - \hat{U}^*_t = \lambda(U^*_{t-1} - \hat{U}^*_{t-1}) + \eta_t$$

where γ , δ and λ are all fixed coefficients and η_t is a white noise error process.

Substituting from (16) into (17) and rearranging terms we can express U* as

$$(18)\quad U^*_t = \mu_0 + \lambda U^*_{t-1} + \mu_1 t + \eta_t$$

where $\mu_0 = (1-\lambda)\gamma + \lambda\delta$ and $\mu_1 = (1-\lambda)\delta$.

Adding $U^*_t - U_{t-1}$ to both sides of (15) and substituting for U^*_t from (18) we can then arrive at an expression for ΔU_t the change in the actual rate of unemployment. This takes the form

$$(19)\quad \Delta U_t = \alpha + \mu_0 + \mu_1 t + (\beta-1)U_{t-1} + (\lambda-\beta)U^*_{t-1} + S\pi + \varepsilon_t + \eta_t$$

Assuming now that λ and β are equal, that is, that the speeds of adjustment of U_t-U^*_t and U^*_t-$\hat{U}^*_t$ are equal, we can eliminate U^*_{t-1}. It is this version of (19) that forms our basic model.

The actual equation we estimated took the form:

$$(20)\quad \Delta U_t = a_0 + b_0 U_{t-1} + b_1 t + \sum_{i=0}^{n} b_{i+2}\Delta^2 \log B_{t-i} + e$$

where the U terms were expressed as decimals, all differences were from fourth-quarter to fourth-quarter, U_{t-1} was the level of the unemployment rate in the initial fourth quarter, B is the monetary base and Δ^2 represents a logarithmic second difference, e the error term and n was alternately 1 and 2.

In estimating this equation, we experimented with both annual and quarterly data and with several <u>a priori</u> reasonable specifications of

the monetary shock terms. Since the annual data provided superior results we report only these regressions. As the evolution of the growth rate of base money is very nearly approximated by a martingale, we used the second difference in log B_t as our measure of the money shock in the regressions reported here.[27] It is well known since Sargent (1976) that our interpretation of these variables as money-shock terms rests upon other information and cannot be inferred from the data.

Table 10 contains estimates of the equation for two sample periods, 1958-78 and 1958-81. Figure 2 shows the actual changes in unemployment and the changes estimated from the equation run over 1958-81 with one lagged value of the monetary term. In all instances, the equations appear reasonably satisfactory: the monetary shock terms taken as a group are statistically significant, the R's are respectable, and the Durbin-Watson statistics allow us to reject the hypothesis of first order serial correlation of the disturbances. Similarly as Figure 2 illustrates, the equation tracks the actual changes in unemployment closely, mimicking most of its movements and lagging on only one of the major turning points.

The standard errors, however, are high--.006 to .007-- compared to the absolute values of the mean changes in the unemployment rate over the two periods of .005 and .007, respectively. Similarly, there are broad confidence intervals around our estimates of the coefficients of U_{t-1}. In the regression with one lagged shock for the period ending in 1978, for example, the plus or minus two standard deviation range is -.668 to .002; in the period ending in 1981 it is -.451 to .250. Translated into values for β, the adjustment coefficient in the conventional Lucas equation, the two imply ranges of .332 to 1.002 and

.549 to 1.250, respectively. Values of β greater than unity make no sense. The equations, therefore, tell us more about the cyclical effects per se of monetary shocks than the specifics of the adjustment process in the presence of such shocks.

To get some idea of the magnitude of these effects, we have performed a dynamic simulation of the equation estimated over the years 1958-78 for the period 1979-81. We show the results in the lower half of Table 10. The simulated changes are clearly in the right direction but the magnitudes are a good deal less than the actual. Cumulating them, we arrive at alternative estimated levels of unemployment in (fourth quarter) 1981 of .077 and .080 versus an actual value of .114.

Several factors could be at work here. One possibility is measurement error. The difference between the regressions for the two period suggest this may be of some importance. The coefficients on the shock terms increase by 50%, which is what one would expect in the presence of a constant measurement-error component and an increasing systematic component of the total variance.

An alternative interpretation of the change in coefficients is that some of the factors we have discussed in the previous section have increased the responsiveness of unemployment to shocks. The increase in unemployment benefits conceivably could have had such effects.

A further possibility is that the natural rate over the period has increased more than the simple linear time trend implicit in the model allows. Some of the factors mentioned in the previous section again are candidates here.

Since a number of economists have pointed to one or more of these factors as having had an important influence, we have performed a

further set of simulations designed to place plausible bounds on the monetary versus non-monetary influences on unemployment. In these simulations we increased the absolute values of the coefficients on the shock terms by two times their respective standard errors. We view that as an upper limit on the monetary effect. These simulations show the monetary shock accounting for 59% of the increase in unemployment in the regression with one lagged term and 77% of the increase in the regression with two lagged terms. In the simulations reported above, in which we used the actual estimated coefficients, the percentages of the increase accounted for 39% and 45%.

It is difficult, therefore, on the basis of these results, to rule out non-monetary factors. Even when we used coefficients at the extreme of the 95% confidence interval we obtained sizeable residuals--23% of the increase in unemployment in one case; 41% in the other.

Another possibility is that shocks other than monetary shocks have been in operation. One, in particular, is oil prices (Parkin 1981). Another is the VAT increase already mentioned. To assess the latter's impact, we have performed a second dynamic simulation, in which we have added .035, the estimate suggested above, to the value of the monetary-shock term in 1979. Table 10 also contains these figures. The addition of the VAT effect, helps somewhat in better explaining the behavior of unemployment through 1980. The predicted levels in 1980 are .075 and .077 versus an actual level of .088. By the fourth quarter of 1981, though, there are larger disparities, estimates of .080 and .088 versus the actual figure of .114.[28]

The remaining possible explanation for this underestimate is misspecification of the shocks themselves. Misspecification could be a

problem because of the very simply measure of expected money used in our equation. If as Parkin (1981) has suggested, individuals mistakenly regard £M3 as the correct definition of money (Parkin focuses on M1) the shock in 1980 would be greater and it would have continued to be strong in 1981.[29] Alternatively, there may have been other variables such as output growth or the PSBR, that individuals used to form their expectations in this episode and which increased the actual anticipated rate of base growth relative to our measure of it.

In conclusion, the unemployment rate regression clearly confirms the importance of the monetary shock. It lends some credence to the idea that the VAT added to the contraction, but our estimates of the effect range from only .5 to .8 of a percentage point increase in unemployment. That still leaves a sizeable unexplained component: close to three percentage points in terms of the simulations reported in the table.

We believe that some of the other factors we mentioned earlier have played a part in this episode but that is more conjecture on our part than anything else. A convincing demonstration of their importance awaits the analysis of micro data on the British labor market.

VI. Conclusions

In summing up, we would like to return to the theme with which we opened the paper, the widespread expectations of continued economic deterioration in Britain that prevailed in the mid to late 1970s. Things were not just bad, they were going to get worse and perhaps at an accelerating pace. Underlying these beliefs, was the history of the

preceding decade and a half, in particular, the profligate monetary postures of past governments, Labour and Conservative alike.

Seen from this perspective, the idea that nothing has changed for the better in Britain since Margaret Thatcher's election is difficult to accept. On the monetary side, there has been a fundamental shift. Monetary growth, correctly measured, has become much less expansionary. The monetary base over the past two years has grown at an annual average of 4.3%, about equal to monetary growth in Germany, which, next to Switzerland, has pursued the least inflationary policy of any European country. Nor is there any sign that a reversal is in the works.

At the same time, there have been two substantial changes for the better in the method of policy execution. Two needless and economically inefficient encumbrances have been abolished--the corset and exchange controls, both sacred cows of the British policymaking establishment. Furthermore, there are at least some signs of additional changes in the right direction in the offing: the Green Paper, though largely an exercise in obfuscation, has been followed by abolition of the minimum liquid asset ratio, previously a convenient excuse for monetary excess, and a move towards greater use of open market operations as the first stage in the execution of policy.

These are all pluses of various degrees on the monetary side. The one minus in this area is the continued adherence, until the March 1982 budget presentation, to targets couched in terms of £M3. Given its misleading movements, the continued reliance on £M3 can only have made it more difficult for economic participants to form expectations correctly.

The major failures of policy have been on the fiscal side: government consumption expenditures through 1981 on average have grown at the same pace as in the 1970s; and, initial rhetoric to the contrary notwithstanding, very little has been done about either the nationalized industries or the size of government in general.

The PSBR as a percentage of GDP, however, fell in the 1981-82 fiscal year and if the new budget projections are to be believed will continue to decrease through 1984. To the extent that the PSBR ought to have been entered on the negative side of the ledger in 1980--and as we have pointed out, we have our doubts that it should have--it is now less of a problem.

Does all of this qualify as a "regime change?" According to some observers, such as Sargent (1981), the answer is that it does not. We disagree. Skepticism appears to have been fairly widespread about the government's resolve to hold to its announced monetary-policy course. That skepticism, however, may have been rational. And, given the behavior of LM3, the signal extraction problem has been an unusually difficult one.

The history of the post-WW II period in Britain is one of continual monetary deterioration, punctuated by only an occasional respite. Extrapolating that trend, perhaps with minor amendment, may be the best one can do. Certainly, an economist trying to predict a change in regime before the fact would be hard pressed to devise a model of anything more than the most rudimentary form. Despite the widespread applications of economic theory to political and regulatory behavior, we simply do not know enough to forecast political developments of the sort in question with any reasonable degree of accuracy.

Consider for a moment the analogous question of what produced the move to liberalism in the nineteenth century in Britain or led to the adoption of the gold standard. Similarly, do we know why the demise of both took place in the first third of this century or, for that matter, why our own era has been the age of inflation? There are no convincing answers to these questions. It is not too surprising, therefore, that immediately after the fact, economic participants have reacted cautiously to the change in Britain that we believe has occurred.

What evidence, though, is there that this change [illegible]damental and not just a trivial interruption of the process of the [illegible]wo decades? Here we point to two events: one is the decrease in economic welfare that the high and variable rates of inflation in Britain have engendered; the other is the change in political structure that has taken place since 1979.

The first is most likely a cause of the second. In principle, an increase in the political costs relative to returns from inflation should lead to a change in politicians' and economic policymakers' behavior. In practice, this seems to be taking place. The split in Labour and rise of the SDP, which <u>de facto</u> differs little in economic policy perspective from the Conservatives, is one indication. The fact that the Bank of England, counter to its previous posture, has not sought to push interest rates lower through monetary expansion is another.

Table 1

Variability of the U.K. Money Multiplier: 1957:I to 1981:IV

	Standard Deviations of Annualized Logarithmic Changes in[a]		
	M1/B	M2/B[b]	£M3/B
Quarterly	.0840	.0832	.0828
Annual	.0427	.0484	.0551
Quinquennial	.0147	.0154	.0150

Sources: NBER International Transmission of Inflation Data Base and Bank of England.

Notes: a - Annual data are fourth-quarter to fourth-quarter; quinquennial fourth-quarter of the year t to fourth-quarter of year t+5.

b - M2 is £M3 less CD and central government deposits.

TABLE 2

Growth in U.K. Monetary Aggregates
1977-1981[a]

Period	Base	M1	M2[b]	£M3
77:I - 79:I	13.9%	16.9%	13.1%	12.8%
79:I - 81:IV	5.8	4.7	12.0	12.6
79:I - 79:IV	9.9	8.4	12.5	11.7
79:IV - 80:IV	4.2	3.9	15.1	16.9
80:IV - 81:IV	4.4	2.7	8.6	8.9

Sources: NBER International Transmission Project Data Base; Bank of England Quarterly Bulletin.

Notes: a - Growth rates are logarithmic first differences of end of quarter data from the initial to the terminal quarter multiplier by 400 and divided by the number of intervening quarters.

b - M2 is £M3 less CDs and central government deposits.

TABLE 3

Adjusted R^2's for
Nominal Income and Inflation Rate Equations

$$\Delta \log Z = a + \sum_{i=0}^{n} b_i \, \Delta \log M_{jt-i}$$

Type of Data/Period Dependent Variable	(n=)	Monetary Variable			
		Base	M1	M2	LM3
Quarterly/60:II to 80:IV					
GDP	8	0.284	0.131	0.207	0.155
	16	0.276	0.140	0.170	0.202
	20	0.254	0.138	0.176	0.238
GDP Deflator	8	0.345	0.150	0.360	0.271
	16	0.347	0.287	0.338	0.355
	20	0.314	0.320	0.354	0.381
Retail Price Index	8	0.539	0.238	0.557	0.397
	16	0.552	0.372	0.599	0.603
	20	0.541	0.380	0.583	0.605
Quarterly/68:II to 80:IV					
GDP	8	0.233	-0.036	0.086	0.022
	16	0.368	-0.010	-0.036	0.139
	20	0.364	0.035	-0.067	0.290
GDP Deflator	8	0.105	-0.029	0.319	0.298
	16	0.230	0.326	0.232	0.254
	20	0.153	0.481	0.217	0.245
Retail Price Index	8	0.331	-0.004	0.515	0.403
	16	0.575	0.319	0.546	0.521
	20	0.532	0.335	0.533	0.487
Annual/60 to 80					
GDP	1	0.565	0.399	0.615	0.331
	3	0.535	0.478	0.660	0.678
	4	0.522	0.456	0.640	0.686
GDP Deflator	1	0.575	0.284	0.574	0.269
	3	0.590	0.570	0.674	0.717
	4	0.586	0.570	0.656	0.718
Retail Price Index	1	0.652	0.254	0.528	0.174
	3	0.652	0.506	0.754	0.752
	4	0.653	0.497	0.739	0.768

CONTINUED

TABLE 3

Adjusted R^2's for
Nominal Income and Inflation Rate Equations

$$\Delta \log Z = a + \sum_{i=0}^{n} b_i \, \Delta \log M_{jt-i}$$

Type of Data/Period Dependent Variable	(n=)	Monetary Variable			
		Base	M1	M2	M3
Annual/68 to 80					
GDP	1	0.381	-0.013	0.550	0.100
	3	0.295	0.076	0.525	0.635
	4	0.625	0.137	0.493	0.584
GDP Deflator	1	0.376	-0.063	0.520	0.064
	3	0.366	0.335	0.520	0.558
	4	0.654	0.479	0.453	0.505
Retail Price Index	1	0.478	-0.087	0.572	0.022
	3	0.406	0.143	0.705	0.667
	4	0.805	0.338	0.663	0.645

Source: NBER International Transmission of Inflation Project data base; Bank of England Quarterly Bulletin, C.S.O., Economic Trends.

TABLE 4

Retail Price Equations
Quarterly Data: 1968:II to 1980:IV

$$\Delta \log P = a + \sum_{i=0}^{n} b_i \ \Delta \log M_{jt-i}$$

	BASE		M1		M2		£M3	
a	0.008	(1.892)	0.014	(2.924)	0.006	(1.376)	0.005	(0.934)
b0	-0.130	(1.355)	-0.031	(0.307)	-0.084	(0.929)	-0.086	(0.611)
b1	0.073	(0.731)	0.082	(0.797)	0.071	(0.743)	0.029	(0.186)
b2	0.371	(3.632)	0.205	(1.910)	0.133	(1.390)	0.076	(0.471)
b3	0.302	(2.920)	-0.098	(0.922)	0.095	(1.013)	0.036	(0.223)
b4	0.146	(1.320)	-0.059	(0.554)	0.059	(0.637)	-0.134	(0.754)
b5	0.257	(2.332)	-0.141	(1.332)	0.017	(0.187)	-0.015	(0.086)
b6	0.363	(3.351)	-0.129	(1.285)	0.228	(2.527)	0.296	(1.712)
b7	0.295	(2.694)	-0.079	(0.795)	0.103	(1.145)	0.023	(0.147)
b8	0.222	(2.050)	0.203	(2.033)	0.242	(2.734)	0.177	(1.095)
b9	0.243	(2.217)	0.147	(1.462)	0.003	(0.033)	0.114	(0.723)
b10	0.003	(0.032)	0.087	(0.855)	-0.012	(0.138)	0.169	(0.972)
b11	-0.146	(1.297)	-0.089	(0.869)	-0.237	(2.637)	-0.304	(1.802)
b12	-0.130	(1.146)	0.073	(0.725)	0.180	(1.881)	0.311	(1.679)
b13	-0.153	(1.399)	0.110	(1.052)	0.049	(0.510)	0.035	(0.202)
b14	-0.328	(3.010)	-0.037	(0.344)	0.056	(0.555)	0.171	(0.978)
b15	-0.325	(2.960)	0.189	(1.800)	0.011	(0.113)	-0.052	(0.311)
b16	-0.307	(2.790)	0.370	(3.517)	-0.011	(0.113)	0.075	(0.503)
$\bar{R}^2$	0.575		0.319		0.546		0.521	
SE	0.010		0.013		0.010		0.011	
DW	1.62		0.91		1.21		0.96	

Source: NBER International Transmission of Inflation Project data base; Bank of England Quarterly Bulletin, C.S.O., Economic Trends.

Notes: a - Absolute values of t-statistics are in parentheses.

TABLE 5

Estimates of Velocity Equations

$$\Delta \log(Y/M_j)_t = a + \sum_{i=0}^{n} b_i \Delta^2 \log M_j \quad ^a$$

Coefficients	Base Velocity		LM3 Velocity	
a	0.008	(3.409)	0.005	(2.033)
b0	-0.876	(5.835)	-0.825	(4.011)
b1	-0.786	(3.691)	-1.055	(4.680)
b2	-0.404	(1.699)	-0.945	(4.187)
b3	-0.125	(0.481)	-1.001	(4.429)
b4	-0.151	(0.504)	-0.491	(2.069)
b5	0.115	(0.350)	-0.689	(2.858)
b6	0.007	(0.020)	-0.617	(2.676)
b7	0.037	(0.103)	-0.643	(2.799)
b8	0.578	(1.583)	-0.459	(2.031)
b90	0.516	(1.455)	-0.534	(2.407)
b10	0.463	(1.355)	-0.281	(1.306)
b11	0.571	(1.910)	-0.104	(0.476)
b12	0.281	(1.046)	-0.087	(0.395)
b13	0.017	(0.071)	0.071	(0.326)
b14	0.177	(1.044)	0.094	(0.490)
$\bar{R}^2$	0.405		0.438	
SE	0.017		0.019	
DW	2.09		2.15	

Source: NBER International Transmission of Inflation Project data base; Bank of England Quarterly Bulletin, C.S.O. Economic Trends.

Note: a - Absolute values of t-statistics are in parentheses.

TABLE 6

Nominal and Real Interest Rates
1979-1980[a]

	3-month local Authority (1)	Inflation (2)	3-month Domestic U.S. CD (3)	Real Rate (4)=(1-2)	Real Rate Adjusted[b] (5)	Interest Differential (6) = (1-3)
1978:III	9.31%	7.35%	8.64%	1.96	1.96	0.67
IV	12.28	11.05	10.72	1.23	1.23	1.56
1979:I	12.18	13.68	10.13	-1.50	-1.50	2.05
II	13.01	28.96	9.95	-15.95	-4.95	3.06
III	14.12	9.93	11.89	4.19	-3.84	2.23
IV	16.86	19.54	13.43	-2.68	-2.68	3.43
1980:I	18.36	17.80	17.57	0.56	0.56	0.79
II	16.64	11.64	8.49	5.00	5.00	8.15
III	15.87	7.35	11.29	8.52	8.52	4.58
IV	14.67	10.71	18.65	3.96	3.96	-3.98

Source: Citibank, N.A., Citibank World Outlook.

Notes: a - Interest rates are averages for the last month of quarter t. Inflation rates are annualized difference in the logarithms of the retail price index in quarter t and t+1.

b - Computed as column (1) minus column (2) except for 1979:II and III. For both quarters, we used average inflation over the period.

TABLE 7

Measures of the British Government Deficit and Real Debt

Year	Nominal PSBR	Nom. Govt. Interest	Deflated PSBR	Real PSBR	Real Govt. Debt
1955	470	770	1,599.5	-2,894.4	108,840
1960	710	1,031	2,019.7	-149.6	97,134
1965	1,205	1,348	2,934.6	-361.1	88,692
1970	4	2,025	7.9	-8,820.6	85,707
1971	1,382	2,089	2,473.4	-5,395.5	80,665
1972	2,054	2,286	3,338.2	-3,584.8	77,729
1973	4,209	2,738	6,307.8	-544.4	74,527
1974	6,437	3,607	8,287.7	-5,827.1	71,423
1975	10,480	4,211	10,480.0	-4,590.4	64,573
1976	9,128	5,394	8,014.6	879.1	68,225
1977	5,993	6,373	4,685.5	-2,711.7	70,648
1978	8,356	7,227	5,860.1	-1,803.7	70,684
1979	12,611	8,950	7,802.1	-2,578.6	67,679
1980	12,244	11,285	6,409.2	-3,198.0	61,805

Sources:

Nominal PSBR, Public Sector Borrowing Requirement in millions of current pounds sterling: see Appendix Table A1. [Negative value indicates surplus.]

Nominal Government Interest, interest payments of the government sector (intra-sector payments excluded) in millions of current pounds sterling: see Appendix Table A1.

Deflated PSBR, nominal PSBR divided by GDP implicit price deflator (1975 = 1.000): GDP deflator is annual average of quarterly data computed as the ratio of nominal to real GDP (see Table 8 for sources).

Real PSBR, deflated PSBR - (inflation rate)×(real debt), in millions of 1975 pounds sterling: inflation rate computed as the logarithmic change from fourth quarter to fourth quarter in the GDP deflator.

Real government debt, nominal debt centered on June 30th and deflated by average of second and third quarter GDP deflators, in millions of 1975 pounds sterling: Data for nominal debt D_t as of March 31st are reported in Appendix Table A1. The June 30th debt is estimated as $0.75D_t + 0.25D_{t+1}$.

TABLE 8

British Government Deficit and Real Debt as a Fraction of Gross Domestic Product

Year	Nominal PSBR	Nom. Govt. Interest	Deflated PSBR	Real PSBR	Real Govt. Debt
1955	0.027360	0.0448234	0.027366	-0.04952	1.86213
1960	0.030875	0.0448340	0.030877	-0.00229	1.48499
1965	0.037973	0.0424791	0.037975	-0.00467	1.14771
1970	0.000091	0.0459584	0.000091	-0.10133	0.98460
1971	0.027673	0.0418294	0.027684	-0.06039	0.90285
1972	0.036772	0.0409258	0.036782	-0.03950	0.85644
1973	0.065193	0.0424085	0.065177	-0.00562	0.77007
1974	0.086083	0.0482370	0.086157	-0.06058	0.74250
1975	0.110832	0.0445336	0.110804	-0.04853	0.68273
1976	0.081792	0.0483333	0.081804	0.00897	0.69637
1977	0.047189	0.0501811	0.047198	-0.02732	0.71166
1978	0.057509	0.0497385	0.057511	-0.01770	0.69370
1979	0.075742	0.0537538	0.075762	-0.02504	0.65720
1980	0.063244	0.0582903	0.063223	-0.03155	0.60967

Sources:

Nominal PSBR and nominal government interest are divided by nominal GDP.

Deflated PSBR, real PSBR, and real government debt are divided by real GDP.

Nominal GDP is an annual average of quarterly data as follows:

1976I-1980IV: Gross domestic product at factor cost and current price based on expenditure data multiplied by 4 to obtain annual rates, from U.K. Central Statistical Office, Economic Trends, November 1981, p. 6.

1955I-1975IV: N.B.E.R. International Transmission Project Data Base, series UKYNQSGD, linked by ratio splice.

Real GDP is similarly computed as follows:

1976I-1980IV: Index numbers (1975 = 100) of same GDP concept from same source multiplied by 0.945 since £94.5 billion is reported as nominal GDP for 1975.

1955I-1975IV: N.B.E.R. International Transmission Project Data Base, series UKYRQSD7, linked by ratio splice.

TABLE 9

Growth in Real Government Spending on Final Goods and Services 1970-1980

	Average Continuously Compounded Growth Rates	
	1970-1979	1979-1980
Real Government Spending	1.1%	0.7%
Real Government Final Consumption	2.5%	2.3%
Real Government Capital Expenditure	-5.6%	-11.4%
Real GDP	2.2%	-1.3%

Source: U.K. Central Statistical Office (K.J. Newman, ed.), National Income and Expenditures, London: Her Majesty's Stationery Office, 1981, Tables 9.3 and 2.1.

TABLE 10

Annual Unemployment Rate Equations: Estimates and Simulation Results

$$\Delta U_t = a + b_0 t + b_1 U_{t-1} + b_2 \Delta^2 \log B_t + b_3 \Delta^2 \log B_{t-1} + b_4 \Delta^2 \log B_{t-2}$$

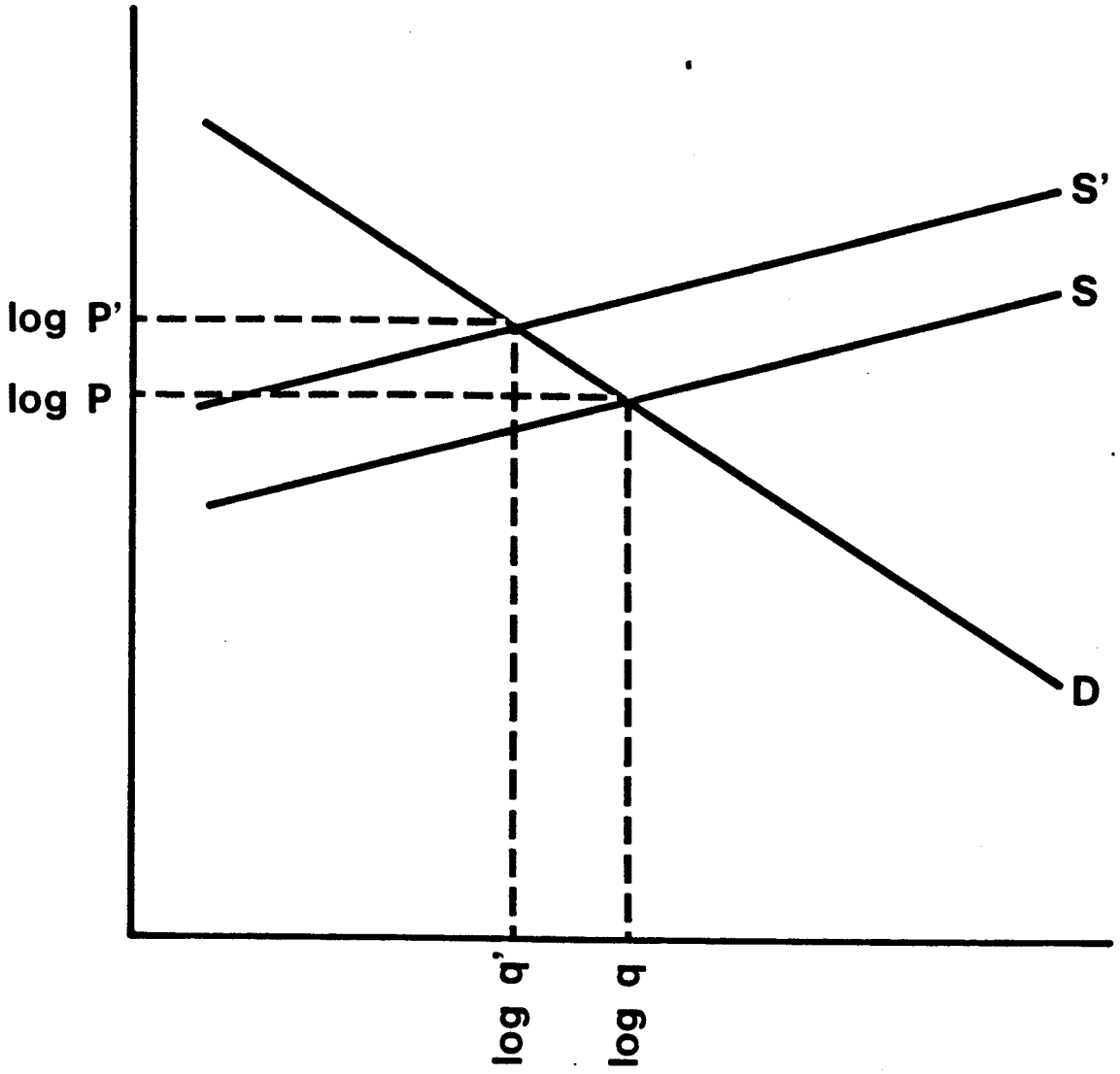
Period	Coefficients[a]								
	a	b_0	b_1	b_2	b_3	b_4	R^2	SE	DW
1958-78	-0.001 (0.369)	0.001 (2.672)	-0.377 (2.147)	-0.101 (2.132)	-0.123 (2.333)	-0.041 (0.863)	0.238	0.006	1.80
	-0.001 (0.413)	0.001 (2.552)	-0.335 (2.003)	-0.092 (2.012)	-0.100 (2.210)		0.294	0.006	1.92
1958-81	-0.003 (0.957)	0.001 (2.206)	-0.201 (1.198)	-0.171 (3.761)	-0.206 (3.805)	-0.067 (1.224)	0.548	0.007	1.87
	-0.004 (1.063)	0.001 (1.847)	-0.105 (0.702)	-0.160 (3.541)	-0.175 (3.615)		0.536	0.007	2.02

Year	Actual	Simulation Results[b] Estimates			
		Money Shocks Only		Money Shocks and VAT	
		t and t-1	t to t-2	t and t-1	t to t-2
1979	.053	.057	.057	.060	.060
1980	.088	.070	.070	.075	.077
1981	.114	.077	.080	.080.	.086

Source: NBER International Transmission of Inflation Project data base; Bank of England Quarterly Bulletin; C.S.O., Economic Trends.

a - Absolute values of t-statistics are in parentheses beneath the coefficients.
b - The estimates in the second and fourth columns are derived from the second regression; those in the third and fifth columns from the first regression.

Figure 1



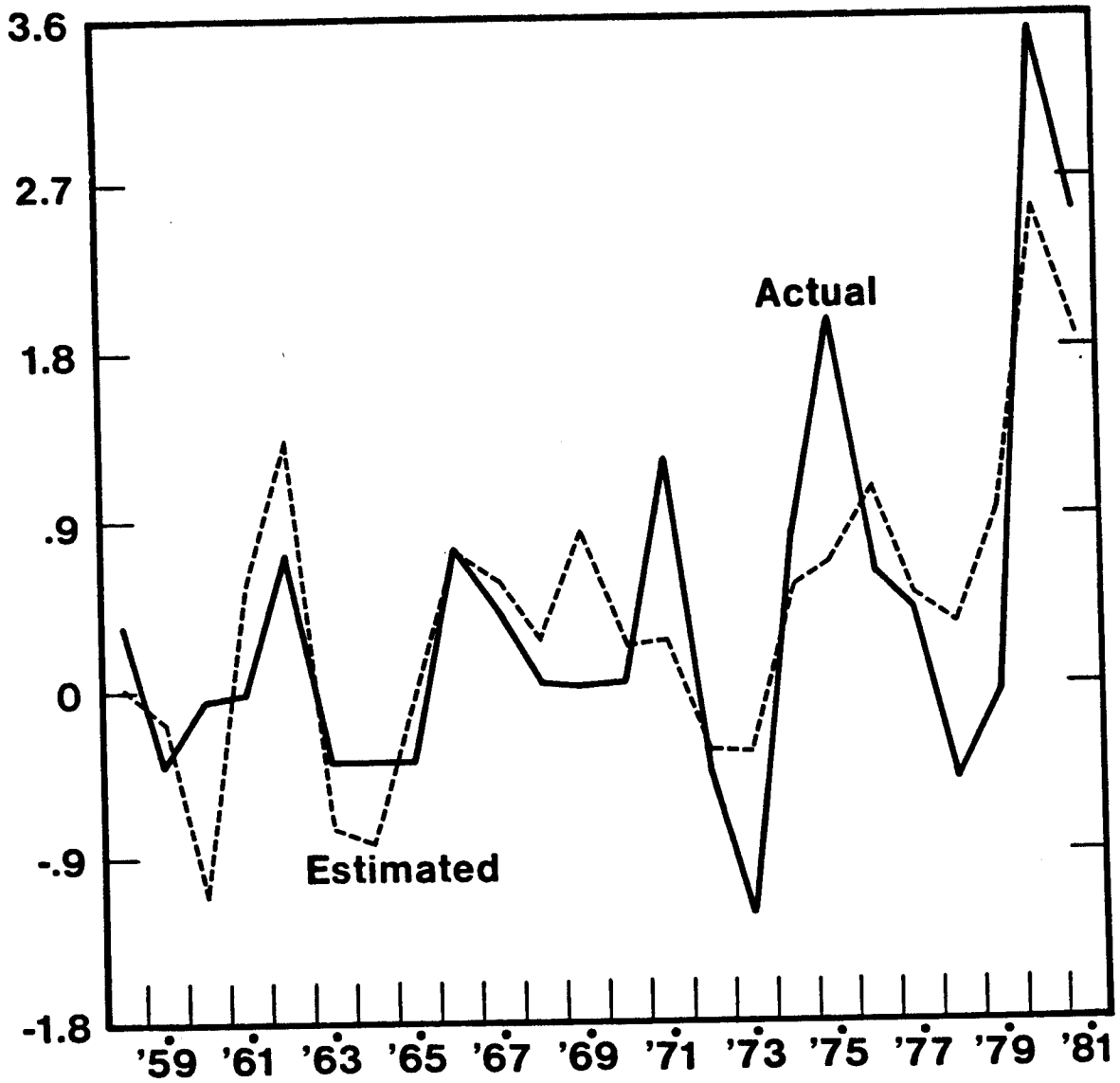
Effects of the Tax Shift on Short-Period Aggregate Supply and Demand—The shift from income to value-added taxation shifts the aggregate supply curve upward temporarily raising prices and lowering output to P' and q' respectively.

Figure 2

U.K. unemployment

Actual and estimated annual changes: 1958-81

per cent



Estimates are derived from the fourth equation of Table 10.

Footnotes

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[1]The Economist, May 5, 1979, p. 13.

[2]See "Conservative Party Manifesto," Keesing's Contemporary Archives, June 1, 1979, pp. 29, 633-29, 638. The platform did indicate (p. 29, 634-29, 635) an intention to simplify and increase the value-added tax to offset income tax cuts.

[3]These comments are not just the result of hindsight. One of the authors was an active participant in this process (Lothian and Burrell, 1976).

[4]See Friedman (1959) for a similar discussion for the U.S.

[5]If the Bank stands willing to discount such securities at par or attempts to peg interest rates, the net outcome of a purchase of government securities by commercial banks can be the same as the purchase of such securities by the Bank itself. Government securities held by banks then become perfect substitutes in supply at fixed rates of exchange with conventional bank reserves. That, however, is a matter

of the policies pursued by the Bank. See in this regard Goodhart (1973), and Griffiths (1973).

[6]Griffiths (1973) and Hodgman (1971) contain extended discussions and critiques of the measures undertaken at this time.

[7]In October 1979, the Federal Reserve altered its procedures, by substituting a borrowed reserves function for a money demand function and borrowed reserves for the nominal money stock as the intermediate target. Nevertheless, the funds rate appears to remain a direct focus of policy operations.

[8]Friedman (1959) details a policy regime that contains most of the features we have in mind.

[9]There have, however, been a series of minor changes that are consistent with an eventual move to monetary-base control. Abolition of the 12.5% liquid asset ratio and a switch from discounting to open market operations are the chief two (Bank of England, March 1981).

[10]Over the combined period 1873-1914 and 1920-1939, the standard deviations of the annual average levels of the three-month treasury bill and the consol rates were 1.234 and .693 respectively; the standard deviations of their first differences, 1.003 and .314. Over the period 1955-1980, the standard deviations of the annual average levels of the three-month local authority and consol rates were 3.229 and 3.367, respectively; of their first differences, 1.754 and 1.061.

[11]Much of the discussion surrounding monetary base control in Britain has a direct American analogue in the debate over current versus lagged reserve requirements. In both cases, there is confusion with respect to what is true for an individual bank and what is true for the system as a whole as examplified in the treatment of the interbank

market as being in every respect similar to the central bank as a source of reserves. Robert Laurent's (1979) article on leading reserve requirements thus serves an equally useful pedagogical function in the British context.

[12]One notable exception is the unpublished study by David H. Howard (1981). He uses monthly data for the period 1973 to 1978 to estimate a commercial banks' demand function for reserves. On the basis of these estimates, Howard (p. 29) concludes "That the banking system's demand for cash reserves is thus a well-defined and well-behaved relationship involving a few observable variables, including bank deposit liabilities. Therefore a policy aimed at achieving a monetary growth target by manipulating the monetary base as conventionally defined appears to be feasible." Also see Sheppard (1971) for evidence on the behavior of the deposit-currency and deposit-reserve rates over the period 1879 to 1962 and Savage (1980) for a brief analysis of the LM3 multiplier over the past decade.

[13]The obvious objection to using the base as the targeted monetary aggregate is its behavior relative to M1 and M2 in the U.S. during the Great Depression of the 1930s. The base was virtually constant while both M1 and M2 plummeted. That episode, however, was a period of financial panic. Britain's last major panic was that of 1866. So long as the Bank of England is willing to discount during times of incipient crisis, should they arise, we see no problem with using the base as the target variable.

[14]With the exception of the series for the monetary base and LM3, all data are updated versions of the National Bureau of Economic Research's International Transmission of Inflation data base. These

series are described in Darby, Lothian et al., forthcoming. All series begin in 1955:I.

The monetary base and £M3 series for the periods 1962:I to 1981:IV and 1963:I to 1981:IV are as published by the Bank of England. We seasonally adjusted these data ourselves, adjusted them for breaks and extended them back to 1955:I using the National Bureau data. A separate data appendix will be made available on request.

[15]Bachelor and Griffiths ignore this same type of evidence. They refer to the negative coefficients on base growth farther back in time as "bizarre," citing them as reasons to distrust the somewhat better statistical fits obtained with the base.

[16]Our ability to obtain this result depends crucially on the type of monetary regime in existence, as Sargent (1976) has pointed out. There has to have been a change in the rate of change of money of sufficient duration that the theoretically expected effects become visible in the data.

[17]Examination of the residuals of the £M3 regressions for retail prices (the only dependent variable for which we had full 1981 data at the time we revised this paper) provides evidence consistent with this explanation. In regressions run over both sample periods we obtained substantially positive residuals for 1979 and early '80 and negative residuals thereafter.

[18]Darby (1975a, p. 220; 1979, p. 219) and Jump (1980) discuss the basic idea. This section formalizes and augments Cagan's (1981) discussion.

[19]Similar measurement problems occur with private debt, but total private sector income and saving are not affected since the biases are exactly offsetting within the private sector.

[20]See Darby (1975b, 1979). We use the operators Δ and Γ here for $\frac{d}{dt}$ and $\frac{d \log}{dt}$ respectively. We are assuming for the moment that neither Tobin effects nor induced capital inflows [Makin (1978)] reduce the real after-tax interest rate as inflation is increased.

[21]Fiscal year data are reported in the Data Appendix Table A1.

[22]Between 1955 and 1980, the real PSBR was in deficit only in 1959, 1967, and 1976. Alternatively, we may suppose that there is a full adjustment of expected inflation but the deficit is reduced by an induced fall in the real interest rate paid on the government debt.

[23]Price (1982) reports a similar lack of progress in reducing subsidies both to nationalized industries and to forms which the National Enterprise Board has bailed out of impending bankruptcy.

[24]Income tax rates were reduced at all income levels but especially at the upper levels. (The 60% maximum tax rate on earned income is lower than at any time since 1930.) The VAT rates were increased to a uniform rate of 15% from 8% on "essentials" and 12.5% on luxuries.

[25]Indeed Sir Geoffrey Howe himself argued that a 7% rise in VAT applied to about half of consumers' expenditure would add about 3½% to the price index. A nearly identical argument is made in Aaron's (1981, p. 12-13) introduction and summary and in Carlson's (1980, p. 65-69) analysis of the price level effects of VAT.

[26]The long run effect is to increase the level but not the growth rate of real income and real money demand. Suppose that the saving-income ratio were increased by as much as 0.02 (indicating an

enormous elasticity) and that the capital-output ratio is 3 and the Cobb-Douglas capital share is 0.25. The maximum increase in equilibrium output occurs in the first year and would amount to about 0.17%. (On the same Cobb-Douglas assumption, the steady state elasticity of real output with respect to the saving-ratio is 1/3.)

[27]The residuals from alternative ARIMA specifications gave qualitatively similar results.

[28]It is tempting to conclude that the difficulty lies in predicting movements within 1981. Possible specification errors caused by temporal aggregation of the data or misspecification of the lag structure make such an inference harzardous.

[29]Parkin's conjecture may well be correct. There are two slips twixt cup and lip in our model: use of the base as an index of some theoretically correct but unobservable definition of money and the use of last period's rate of change as a proxy for this period's expected rate of change of the base.

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APPENDIX TABLE A1

Basic Data for Analysis of Government Debt and Deficit

Year	Nom. Govt. Debt March 31st	Nominal PSBR (annual)	Nominal PSBR (fin. year)	Nom. Govt. Debt Interest
1955	31,810	470	--	770
1956	32,187	573	--	804
1957	32,727	487	--	808
1958	33,276	491	--	899
1959	33,364	571	--	915
1960	34,037	710	--	1,031
1961	34,531	704	--	1,117
1962	35,313	546	--	1,114
1963	35,717	842	1,084	1,199
1964	36,677	989	880	1,257
1965	36,175	1,205	995	1,348
1966	36,962	961	1,214	1,465
1967	38,098	1,863	1,980	1,573
1968	41,249	1,295	453	1,794
1969	41,756	-445	-526	1,929
1970	42,996	4	803	2,025
1971	44,313	1,382	1,014	2,089
1972	47,544	2,054	2,532	2,286
1973	48,514	4,209	4,450	2,738
1974	52,786	6,437	7,950	3,607
1975	61,603	10,480	10,602	4,211
1976	74,331	9,128	8,510	5,394
1977	87,739	5,993	5,595	6,373
1978	98,553	8,356	9,233	7,227
1979	107,350	12,611	9,902	8,950
1980	115,577	12,244	13,195	11,285

Sources:

Nominal government debt held outside public sector, as of March 31st in millions of current pounds sterling:

1969-1979: U.K. Central Statistical Office, Annual Abstract of Statistics, 1981, Table 16.5, row 7, p. 377.

1980: 1979 debt plus financial-year PSBR.

1981: 1980 debt plus financial-year PSBR.

1965-1968: U.K.C.S.O., ibid., issues of 1976 (p. 365), 1977 (p. 371), 1979 (p. 377), and 1980 (p. 376), respectively.

1964: U.K.C.S.O., ibid., 1975, Table 365, last row, p. 353.

1955-1963: Difference between total outstanding debt and total identified holdings of public sector debt within the public sector from U.K.C.S.O., ibid., 1964 (p. 273), 1965 (p. 273), 1967 (p. 282), 1967 (p. 282), 1970 (p. 311), 1970 (p. 311), 1972 (p. 328), 1973 (p. 329), and 1974 (p. 340), respectively.

Nominal PSBR, Public Sector Borrowing Requirement in millions of current pounds sterling:

1970-1980: U.K.C.S.O., National Income and Expenditures, 1981 ed., Table 13.12, p. 101.

1967-1969: U.K.C.S.O., ibid., 1967-1977 ed. (p. 105), 1979 ed. (p. 103), 1980 ed. (p. 98), respectively.

1963-1966: U.K.C.S.O., Economic Trends, Ann. Suppl. 1975 (p. 109), May 1976 (p. 52), Jan. 1977 (p. 52), Jan. 1977 (p. 52), respectively.

1955-1962: Bank of England, Statistical Abstract No. 1, 1970, p. 79.

Nominal PSBR for financial-year beginning April 1st, in millions of current pounds sterling: (For 1971-1980 computed as sum of "Central government borrowing requirement" and "Other public sector contribution):

1976-1980: Bank of England, Quarterly Bulletin, Table 11.3, Dec. 1981.

1973-1975: Bank of England, Quarterly Bulletin, Table 11.3, Mar. 1981.

1972: Bank of England, Quarterly Bulletin, Table 11.3, Mar. 1980.

1971: Bank of England, Quarterly Bulletin, Table 11.3, Mar. 1979.

1965-1970: U.K.C.S.O., Economic Trends, Jan. 1977, p. 52.

1963-1964: U.K.C.S.O., Economic Trends, Ann. Suppl. 1975 (p. 109), May 1976 (p. 52), respectively.

Debt interest of general government (excludes intrasector payments) in millions of current pounds sterling:

(For 1955-1968 computed as sum of central government and local authorities debt interest where latter excludes interest on loans from central government.):

1970-1980: U.K.C.S.O., National Income and Expenditure, 1981 ed., p. 59.

1967-1969: U.K.C.S.O., ibid., 1967-1977 ed. (p. 65), 1979 ed. (p. 63), 1980 ed. (p. 59), respectively.

1962-1966: U.K.C.S.O., ibid., 1973 ed., p. 51.

1955-1961: U.K.C.S.O., ibid., 1966 ed., p. 59.