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Abstract

Using the most rudimentary models, this note explains how the pursuit by workers and firms of collectively unobtainable goals for real wages and real profits can lead not simply to a higher rate of inflation but to an explosive inflation. The rudimentary nature of the models allows a clear link to be forged between these conflicting aspirations and the distribution of national income. The models exclude any notion that workers or firms form, or act upon, expectations about future inflation but can generate the equivalent of a non-accelerating inflation rate of unemployment, a concept absent from many complex conflict models. Out of academic fashion since the 'defeat of inflation', conflict models may now enjoy a revival of interest from policy makers should the British economy suffer a period of 'stagflation'. If so, solutions proposed by British academics who developed the inflation conflict approach in the 1970s and 1980s would warrant their own revival.

Keywords: inflation, conflict, stock-flow consistency, British economy.

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Inflation conflict models in the British context: a very brief history

In the fraught 1970s there was an acute shortage of effective remedy for Britain's mounting economic problems but no shortage of rival explanations for the coincidence of high, unstable rates of inflation and, judged by the standards of the day, high unemployment. Remedies included the by-then standard attempts to impose a prices and incomes policy and budgetary restraint, partly to comply with the demands of the International Monetary Fund to which Britain was indebted, but in addition new ventures, notably monetary policy reform and experimentation with (initially unpublished) money supply targets. None of the remedies worked, or worked for long. The attempt to restrain wages collapsed in widespread industrial discord in the late-1970s (the 'winter of discontent') and budget deficits persisted well above the norm of the 'Golden Age' 1950s and 1960s. The introduction in 1971 of the monetary reform, known as Competition and Credit Control (CCC), proved counter-productive; as the economic historian Duncan Needham puts it: 'w[W]hat followed was one of the most intense periods of monetary chaos in recent British history'.[1] The explanations for 'stagflation' – a term coined some years earlier by the Conservative politician Iain Macleod – were many and varied. They ranged from the establishment view that inflation was either imported or the result of labour militancy – 'wage-push' – aggravated by 'threshold' agreements explicitly linking pay to price increases - to those of the emergent, later to be ascendant, monetarist school, who attributed the malaise to excess monetary growth accompanying lax budgetary policy and heightened expectations of future inflation. A compendium of rival explanations published in *The American Economic Review* in September 1976 gives a good sense of the debate at that time; circumstances in the first half of the 1970s were such that John Williamson and Geoffrey Wood could legitimately write, 'Virtually every model of inflation […] would have predicted a major acceleration of wage inflation in 1973-74.'[2] The timing of that publication was unintentionally ironic. In the same month, the Prime Minister, James Callaghan, famously disowned Keynesian demand management policy in a speech to the Labour Party. The Chancellor, Denis Healey, had just announced an aspirational forecast - not quite a target - for money supply growth. In his memoirs, Healey attests that he had 'abandoned Keynesianism in 1975'.[3] The post-war consensus in which political parties committed to maintain full-employment was over, and so too was the intellectual consensus that demand management policy could keep unemployment low – below a 'natural rate' – without setting off an explosive, 'accelerating' inflation.

From this chaos came a renewed attempt amongst some economists to synthesise the rival schools of thought – imported inflation, 'wage-push' inflation, 'demand pull' inflation – and to explain the instability of the inflation process and its coincidence with high rates of unemployment. In a short book published in 1976, John Flemming, later to become Economic Adviser to the Governor of the Bank of England, introduced the concept of 'changes of gear' in the formation of inflation expectations, when people's realisation that inflation had a trend makes a once stable process unstable. Using simple algebra, Flemming showed that 'when such a "change of gear" takes place in an upward direction there is an exceptionally large increase in the expected price level […]'.[4] A year later, Robert Rowthorn published a seminal paper in the *Cambridge Journal of Economics* which went further in combining a conflict theory of inflation (favoured by the Marxist school, amongst others) and the monetarist school's emphasis on monetary growth and shifting inflation expectations.

The 'conflict' in inflation conflict models arises in principle when the aspirations for real standards of living held and pursued by competing economic groups collectively exceed the maximum level of real income that the economy can sustain. That maximum depends on productivity and the terms on which international trade is conducted. A loss of productive capacity or a rise in the price of imports relative to the price of exports – a deterioration in the international terms of trade – implies less real income for each member of the population, who may or may not adjust to the new austerities. Some with economic advantage may successfully resist, effectively placing the burden of adjustment on others.

In conflict models, the rival aspirations are typically construed as the real wage demands of workers and the real profit aspirations of firms but, as Rowthorn allowed, they can include as well the demands of many sections of the population, such as those expecting certain levels of public provision. In these cases, the conflict arises between the recipients of the public goods or services and those who pay for them through general taxation. The notion of societal conflict was readily understandable in the fractious conditions of the 1970s and, although not fully appreciated at the time, the growth of the economy's productive capacity – and so the growth in real wages that could be supported - had permanently fallen following the exhaustion of – in Britain, limited - post-war productivity catch-up with the, by then, slowing American productivity frontier. The terms of trade deterioration brought about by the first oil price shock had similarly curtailed attainable real income.

Rowthorn further introduced the idea of an 'adaptive mechanism': a shift in behaviour that may come once the inflation rate exceeded a 'certain critical

point'. In his model, anticipated inflation might then equate with expected inflation – the concept missing from the by-then discarded standard Phillips-curve relationship that had linked money wage increases with unemployment.[5] In the circumstances envisaged by Rowthorn once the critical point was passed, inflation would become 'explosive' even in the presence of a small incompatibility in the real wage and profit margin aspirations of workers and firms. Finally, Rowthorn drew on the notion of 'a reserve army of labour', the intellectual history of which stretched back to the 19th century writings of the communists Friedrich Engels and Karl Marx, to recast the basis for a 'natural' rate of unemployment, as proposed in the late-1960s models of Edmund Phelps and the monetarist Milton Friedman.[6] In Rowthorn's conception, a reserve army of labour was required to contain otherwise excessive real income aspirations.

Developing Rowthorn's analysis in his 1982 book 'Wage-fixing', James Meade constructed a conflict model of inflation in which the aspirations of workers had become excessive not only as a result of a deterioration in productivity growth and in the terms of trade, but also because of a form of moral hazard (not Meade's terminology) brought about by governments' post-war commitment to full-employment policy. 'Monopolistic organisations of workers' were 'thus encouraged, to make wage claims which are not designed to promote employment but rather simply to improve the standard of living for the employed members of the particular group of workers in question […]'.[7] Meade compared the inflation process resulting from over-ambitious wage claims to an attempt to extract a 'quart out of a pint pot'.[8] In the later theoretical synthesis, notably propounded by Layard, Nickell and Jackman (1991), variants of the conflict theory of inflation were refashioned (the 'battle of the mark-ups') and became mainstream. But their influence subsequently waned, and perhaps not surprisingly so in view of what was (it turns out, prematurely) regarded as the defeat of inflation and, it was contended, the key roles played by the introduction of inflation targets, replacing previous money supply and exchange rate targets, and by the increased independence of the Bank of England. On this new analysis, there was no latent industrial conflict, the trade unions having been subdued, and inflation was set to stay low. Today's favoured dynamic stochastic general equilibrium (DSGE) models are typically populated by 'rational' fully informed, infinitely forward-looking agents, with the inflation rate gravitating towards the level targeted by a credible central bank; as expert chroniclers of the Bank of England's complex DSGE model put it: 't[T]he monetary authority ensures that money growth delivers its inflation target along the balanced growth path'.[9] Conflict theories that seemed to fit the circumstances of the 1970s and 1980s have thus fallen out of academic fashion and now hold sway only in non-consensus, typically post-

Keynesian macroeconomic models. Marc Lavoie's 2022 textbook carefully articulates post-Keynesian thinking.[10] Other recent modern treatments in the same vein include those by Nah and Lavoie (2019) and Lucas (2021).

At the time of writing (the early days of September 2022), circumstances seem auspicious for a renewal of interest in inflation conflict theories. The credibility of the, previously dominant, rival school of thought – that inflation was 'anchored' by the two per cent inflation target – has suffered alongside the reputation of the Bank of England: the balance of public satisfaction with the Bank registered in its quarterly survey fell to minus 3 per cent in May 2022, the lowest score by far in records that begin in November 1999.[11] Such a loss of confidence in the central bank's capability is perhaps unsurprising with inflation five times the target level, with more overshoot in prospect. Other conditions for an acrimonious wage-price spiral seem to be in place. The Bank of England's actions during the coronavirus pandemic – notably the escalation in its purchases of government bonds in 2020 – effectively money-financed a major fiscal expansion, an outcome qualitatively similar to that seen during the Chancellor Anthony Barber boom years and CCC monetary policy reform of the early-1970s. The ratio of the broad money stock to the nominal value of the gross domestic product (GDP) rose sharply: by the end of 2021, the previously fairly stable ratio was some 15 per cent above its level two years earlier.[12] Although high inflation has subsequently eroded excessive real money balances, further money-financed fiscal accommodation cannot be ruled out. To this possibility may be added the deleterious impact on the economy's attainable real income of the deterioration in the international terms of trade due to escalating imported energy costs (with the associated 'cost of living crisis') and various decrements to the economy's productive capacity. Impediments partly related to global disruption to supply chains and domestic labour force shortages have simultaneously reduced the economy's ability to meet rival groups' real income aspirations while strengthening the power of workers, individually and collectively, to seek compensatory wage settlements. Industrial disputes have escalated. It is, however, unclear whether the economy is undergoing a *permanent* change of regime from the one previously characterised by high profitability, abundant labour supply and real wage flexibility to its opposite, essentially a reversal of the traverse begun in the 1970s.

With the relevance of conflict models at least temporarily renewed, the purpose of this note is to show how inflation can emerge in the most rudimentary theoretical construction. Although a matter of opinion, the complexity of some modern conflict models – featuring, for example, Nash equilibria and sophisticated (critics might say "arbitrary") dynamics – may obscure the (very)

basic mechanisms at play, including the link with the shares of total income represented by wages and profits. By design, workers and firms either do not form expectations about future inflation in these rudimentary models, or, if they do, choose not to act on those expectations. In addition to its simplicity, this artifice squares with a sceptical, albeit controversial, view of the importance of inflation expectations expressed by US Federal Reserve Board economist, Jeremy Rudd. He argues from both a theoretical and empirical point of view that '[…] using inflation expectations to explain observed inflation dynamics is unnecessary and unsound'.[13] Abstracting from the role of expectations, the rudimentary models presented here nevertheless predict not simply the emergence of inflation, but the generation of a steadily rising rate of inflation – an 'accelerationist' outcome - in the presence of excessive real income aspirations and monetary accommodation. Using Meade's analogy, workers and firms try to extract a quart out of a pint pot by taking multiple dips.

Assumptions

There are a number of basic assumptions. The economy is closed. The output to labour ratio – labour productivity - is constant with the units of labour (L) and output (O) chosen so that their ratio has a unit value. The quantity theory of money holds with the velocity of circulation equal to one.

Monetary policy has two polar opposite settings. Under fully accommodating monetary policy, the authorities target a constant full-employment, full-capacity level of output ($\bar{O}$). The (endogenous) money stock (M) is given by: $M = P\bar{O}$. Under a fully non-accommodating monetary policy, the authorities hold the money stock level constant (denoted, $\bar{M}$). In this case, the volume of output is given by: $O = \frac{\bar{M}}{P}$. An alternative construction having the same analytical effect would replace any notion of the money stock with a government objective for the level of nominal GDP.

Firms (which are identical) seek a target price (P) to wage (W) ratio, denoted $Z^* \equiv \left(\frac{P}{W}\right)^*$. Workers (also identical) seek a target wage to price ratio, the target real wage, denoted $X^* \equiv \left(\frac{W}{P}\right)^*$. The conflict that produces inflation arises when these aspirations exceed the maximum real income that the economy can sustain; that is when $Z^* X^* > 1$.

The product of the *actual* price to wage and wage to price ratios is of course definitionally equal to one: $ZX \equiv \left(\frac{P}{W}\right)\left(\frac{W}{P}\right) \equiv 1$. These ratios can be usefully interpreted in terms of the shares of profit and of wage income in total income. Since, by assumption, $\frac{O}{L} = 1$, it follows in this case that the price to wage ratio is equivalent to the inverse of the wage share: $\frac{P}{W} = \frac{PO}{WL} = \frac{1}{\left(\frac{WL}{PO}\right)}$. The real wage is equivalent to the wage share or one minus the profit share: $\frac{W}{P} = \frac{WL}{PO} = \frac{PO - S}{PO} = 1 - \frac{S}{PO}$, where S denotes profit income. An increase in the price to wage ratio thus implies a fall in wage share. Conversely, an increase in the wage to price ratio implies a fall in profit share. Since the profit and wage shares sum to unity, the product of these two share identities is also unity:

$$\left(\frac{P}{W}\right)\left(\frac{W}{P}\right) = \left(\frac{1}{\left(\frac{WL}{PO}\right)}\right)\left(1 - \frac{S}{PO}\right) = \left(\frac{1}{1 - \frac{S}{PO}}\right)\left(1 - \frac{S}{PO}\right) = 1.$$

These definitions apply ex post. Ex ante, however, Z^*X^* may exceed or fall short of unity.

Model 1: Workers achieve real wage target; Firms miss mark-up target

In the first rudimentary model, there is no 'money illusion' and workers continuously achieve their real wage target. However, impediments to re-contracting prices prevent firms from achieving their desired mark-up. In the first instance, monetary policy is accommodating, with output fixed at its constant full-capacity level.

Expressed more formally, workers receive a nominal wage each period of time (denoted by the subscript "*t*") that satisfies the real wage target:

$$W_t = X^* P_t \qquad (1)$$

Firms' pricing is subject to fixed contractual arrangements that limit to a fraction of the total those prices that firms can change each period. The changed fraction of prices satisfies the mark-up target: $Z^* W_t$. The complementary fraction of firms' prices stays at the previous period level, P_{t-1}.

The current price level is a geometric weighted average, with weights "$1-v$" and "v", of the previous and re-contracted prices:

$$P_t = \left(P_{t-1}\right)^{1-v}\left(Z^*W_t\right)^{v} \qquad (2)$$

It would be possible to re-express these wage and price equations in logarithmic form, a common practice in the literature, but with the possible cost of obscuring the underling simplicity of the ideas. The presentation here proceeds with the equations in their original form.

The substitution of the current period wage level, determined by equation (1), in the price level equation (2) and some re-arrangement (see derivation A in the annex) gives:

$$\frac{P_t}{P_{t-1}} = \left(Z^*X^*\right)^{\frac{v}{1-v}} \qquad (3)$$

Denoting a change in a variable from the previous period by the prefix Δ, it follows that the current rate of price inflation, denoted Π_t and defined by $\Pi_t \equiv \frac{\Delta P_t}{P_{t-1}}$, is determined by:

$$\Pi_t = \left(Z^*X^*\right)^{\frac{v}{1-v}} - 1 \qquad (4)$$

Since $0<v<1$, $\frac{v}{1-v}>0$ and $\lim_{(Z^*X^*)\to 1}\left(Z^*X^*\right)^{\frac{v}{1-v}} = 1$ the basic conflict model predictions follow immediately from equation (4):

$\Pi_t > 0$ if $Z^*X^* > 1$: persistent inflation due to excessive real income aspirations;

$\Pi_t < 0$ if $Z^*X^* < 1$: persistent deflation due to deficient real income aspirations;

$\Pi_t = 0$ if $Z^*X^* = 1$: price stability with compatible real income aspirations.

To illustrate, consider a case in which from a state of price stability, with the target price to wage ratio and target wage to price ratio both equal to one, workers raise their target real wage by one per cent. Firms concede, but are unable fully to reflect the resulting higher level of money wages in their pricing because of contractual constraints. If the price setting equation is assumed to take the specific form $P_t = P_{t-1}^{0.5}\left(Z^*W_t\right)^{0.5}$ so that $P_t = \left(Z^*X^*\right)P_{t-1}$, the price level will rise by 1 per cent, but money wages will rise by 2 per cent. The extra 1 per cent rise in money wages

is conceded so that workers can secure the 1 per cent increase in the real wage target at the new price level. The result is two-fold: first, inflation has emerged after a period of price stability; second, firms have lost out. As a result of the contractual constraint which fixes a proportion of prices at their previous level, the ratio of the price level to the wage level has fallen by 1 per cent. The scene is set for a continuing inflation. In the next period, firms will raise prices to incorporate the increased level of prices of the previous period. At the same time, firms will concede a higher level of money wages to meet workers' demands for an (assumed unchanged) target real wage at the new second-period price level. The levels of money wages and of prices will each rise by one per cent in the second period, and in all subsequent periods as long as the collective real income aspirations of workers and firms remain excessive.

It should be noted that firms in this example never again achieve their target margin. The extent of that shortfall may be simply expressed as follows. From the wage equation (1), the achieved price to wage ratio is the reciprocal of workers' target wage to price ratio: $\frac{1}{X^*}$. It follows that the ratio of firms' target price to wage ratio to the achieved price to wage ratio is given by:

$$\frac{Z^*}{\left(\frac{P_t}{W_t}\right)} = \frac{Z^*}{\left(\frac{1}{X^*}\right)} = Z^* X^* \qquad (5)$$

Inflation occurs when $Z^* X^* > 1$, implying a shortfall measured against the target: $Z^* > \frac{P_t}{W_t}$.

In the example, wage and price inflation are the means by which the distribution of (fixed) national income shifts in favour of workers and against firms, which become the dissatisfied party to the conflict. A shift in income distribution is not however an inevitable consequence of collectively excessive real income aspirations. In this first rudimentary model, firms would not succeed in shifting the distribution of income in their favour by raising their target mark-up. By assumption, workers are the dominant party and are able to set the real wage and its inverse, the ratio of the level of prices to wages, the ratio which firms target. In the numerical example, the result of a one percent increase in the target price to wage ratio would be the emergence in all periods of a steady one per cent inflation of both prices and money wages, but no increase in the achieved profit margin, which would continuously fall short of the new target. The essence of the conflict approach to modelling inflation is not a shift in income distribution as a result of inflation, although such a shift may occur, but rather the persistence of,

in aggregate, excessive real income aspirations and the dissatisfaction of at least one of the parties to the conflict. No conflict, no inflation.

These results emerge under the assumption that monetary policy is accommodating. If, on the other hand, monetary policy is non-accommodating in the presence of immutable excessive real income aspirations, output would fall below its capacity level, and would continue to fall as long as inflation persisted. The only circumstance in which output would not fall is one in which the price to wage ratio targeted by firms and the wage to price ratio targeted by workers are fully compatible, that is: $Z^*X^* = 1$. However, real income aspirations may not be immutable; instead, they may respond to the level of activity. If so, with $Z^*X^* > 1$ at full-capacity output, a level of involuntary unemployment and spare capacity would be required permanently to contain, and bring into conformity, otherwise excessive real income demands.

As a simple example, assume the relationship between real income aspirations and activity is given by:

$$Z^*X^* = A\left(\frac{O_t}{\bar{O}}\right)^{\tau} \qquad (6)$$

where A denotes other forces that affect the combination of the two targets. In the inflationary case of interest here, A takes a value in excess of unity so that $Z^*X^* > 1$ should $O_t = \bar{O}$. The parameter tau, τ, is an elasticity with a positive value.

The condition for price stability is: $Z^*X^* = A\left(\frac{O_t}{\bar{O}}\right)^{\tau} = 1$ or, on rearrangement:

$$\frac{O_t - \bar{O}}{\bar{O}} = \left(\frac{1}{A}\right)^{\frac{1}{\tau}} - 1 \qquad (7)$$

Equation (7) has a negative value granted that $A > 1$ and $\tau > 0$.

In this case, the price-level stable economy would run permanently below full-capacity, $\bar{O} > O_t$, with the equivalent of a reserve army of labour.

Model 2: Firms achieve target markup; Workers miss target real wage

A second rudimentary model may be considered, but briefly as the implications are symmetric with those of the first. In the second model, firms have a dominant market position, achieving their target level of real income. Wage setting is subject to a time lag, however, comparable to the price re-contracting constraint faced by firms in the first model.

Expressed more formally, firms set prices at the target ratio to the current wage level:

$$P_t = Z^* W_t \tag{8}$$

Workers are contractually constrained so that the current wage level is a geometric weighted average of the previous period wage level and the desired level of money wages given the current price level:

$$W_t = W_{t-1}^{1-u} \left(X^* P_t \right)^u \tag{9}$$

After some rearrangement (see derivation B in the annex), the solution for the rate of inflation becomes:

$$\Pi_t = \left(Z^* X^* \right)^{\frac{u}{1-u}} - 1 \tag{10}$$

which, apart from the change in weights, is symmetric with equation (4): $\Pi_t = \left(Z^* X^* \right)^{\frac{v}{1-v}} - 1$. The polar opposite cases of conflict models, one in which workers are market dominant, the other in which firms are market dominant, produce the same qualitative predictions for the rate of inflation.

Model 3: Workers achieve real wage target; Firms try to catch-up

A notable feature of these rudimentary models is the absence of the key property associated with a 'natural' or non-accelerating inflation rate of unemployment, a level of unemployment below which inflation becomes explosive. With accommodating monetary policy, inflation in these basic models is permanent and steady, not 'accelerating'. By contrast, Rowthorn's conflict model with its 'adaptive mechanism' does predict a natural rate in a circumstance in which future inflation is fully taken into account in the wage bargain. This theoretical possibility is accepted but given short shrift by most post-Keynesians who, while embracing inflation conflict models, 'have very little faith in the natural rate of unemployment'.[14]

It is then of some interest to find that a simple extension of the rudimentary conflict models leads to the prediction of an 'accelerationist' state in which inflation can continue to rise in the face of excessive real income aspirations. By construction, the rudimentary models considered here do not depend on Rowthorn's adaptive mechanism or on any distinction, which he carefully drew, between anticipated and expected rates of inflation. Even were workers and firms to form expectations about future inflation, the assumption is that they choose not

to act on them. Instead, consideration is given to the possibility of a change in behaviour brought about by a reaction to thwarted aspirations.

Inflation occurs in these rudimentary models when at least one of the parties to the real income conflict remains permanently dissatisfied and aggregate real income aspirations are excessive. Behind this prediction lies the assumption that price and wage setting behaviour remains unmoved by the continuing frustrations of the aggrieved. That assumption is questionable. Consider, for example, the first rudimentary model in which firms never achieve their target margin in the presence of inflation. Why would firms willingly accept such a shortfall not only in the current period but in all past periods? This was indeed the nature of the question I posed when critically appraising the contention that firms' 'historic cost' pricing policy could account for the 1970s 'profits crisis'.[15] The same question in principle may be asked of all conflict models in which the real income aspirations of one or both of the competing groups, construed as workers and firms, are persistently thwarted.

In the specific case of the first model, one might hypothesise as an alternative behaviour that firms attempt to clawback past profit shortfalls by changing their pricing policy. To clawback shortfalls, firms could uprate the fraction of their prices over which they have contractual freedom by a factor in excess of the desired mark-up on the level of current wages. That factor could be the constant target price to wage itself, a process producing a cumulatively rising target mark-up ratio, albeit one that would still fail to secure an actual price to wage ratio that fulfilled firms' aspirations. The effect of the cumulatively rising target mark-up ratio would not be a steady rate of inflation but rather a steady increase in inflation. By extension, the margin catch-up variant of the rudimentary conflict inflation model would embody the equivalent of a natural or non-accelerating inflation rate of unemployment.

In this variant of the first rudimentary model, consideration is given to a form of catch-up pricing:

$$P_t = \left(P_{t-1}\right)^{1-\nu}\left(Z^* W_t\left[\frac{Z^*}{\left(\frac{P_t}{W_t}\right)}\right]^{t\phi}\right)^{\nu} \qquad (11)$$

Compared to the original formulation of firms' price setting (equation (2)), the current price level in equation (11) incorporates (within the square brackets) a catch-up adjustment to the target price to wage ratio resulting from any discrepancy between that target and the actual price to wage ratio. In this model,

the latter is a constant, so $\frac{P_t}{W_t} = \frac{P_{t-1}}{W_{t-1}}$, and equal to the reciprocal of workers' target wage to price ratio. If the ratio of the target price to wage ratio to the actual price to wage ratio exceeds unity, an upward adjustment is made to the desired mark-up that applies in the current period. The catch-up adjustment has two elements. It is, first, proportional to any recent shortfall, with the proportion determined by the value of the parameter phi, ϕ ($0 < \phi < 1$). The adjustment is, second, cumulative, rising in magnitude each period ($t = 0,1,2...$). In engineering terminology, the catch-up adjustment (or 'error correction') incorporates both 'proportional' and 'integral' control, the latter to make good the cumulative effect of all past margin shortfalls. In the conflict inflation literature, an allowance for 'proportional' control, to address a recent shortfall, is commonplace, but the scarcity (absence?) of 'integral' control is puzzling. Why would firms confine their attention to the most recent profits shortfall and ignore all previous shortfalls? In alternative terminology, the 'integral' control can be seen as a means to produce a consistency for firms between the 'flow' of profits each period and the cumulative 'flow', related to some notion of firms' wealth or, in some circumstances, their capital 'stock'. Stock-flow consistency, in which there exist feedbacks between flows and the accumulation of flows, is a feature claimed by post-Keynesians to be a central feature of their models. Were the same error correction applied to wage demands in the second rudimentary model, the integral control would correspond to some notion of workers' cumulative real income, or wealth-like stock. The relevance of this form of error correction was recognised long ago.[16] More broadly, the notion of 'integral control' may be seen as a mathematical abstraction that here tries to capture something of the deep frustration that may be felt by rival economic groups whose aspirations have never been satisfied.

With some re-arrangement and substitution using equation (11), the ratio of successive price levels can be expressed as (see derivation C in the appendix):

$$\frac{P_t}{P_{t-1}} = \left(Z^* X^* \left(Z^* X^* \right)^{t\phi} \right)^{\frac{\nu}{1-\nu}} \qquad (12)$$

The implication for the ratio of the current to the previous period price level can be traced from an arbitrary starting point ($t = 0$) for all subsequent time periods, for example:

period 1: $\frac{P_1}{P_0} = \left(Z^* X^* \left(Z^* X^* \right)^{\phi} \right)^{\frac{\nu}{1-\nu}}$;

period 2: $\frac{P_2}{P_1} = \left(Z^* X^* \left(Z^* X^* \right)^{2\phi} \right)^{\frac{\nu}{1-\nu}}$;

period 3: $\frac{P_3}{P_2} = \left(Z^* X^* \left(Z^* X^* \right)^{3\phi} \right)^{\frac{\nu}{1-\nu}}$,

and so on.

If $Z^* X^* > 1$, as will be assumed, and monetary policy is accommodating, inflation does not stabilise, as in the first model, but instead increases in each period. The magnitude of this periodic increase is given by (see derivation D in the appendix):

$$\frac{\Delta \Pi_t}{1 + \Pi_{t-1}} = \left(Z^* X^* \right)^{\frac{\phi\nu}{1-\nu}} - 1 \qquad (13)$$

The combination of equation (13) and the simple relationship between real income aspirations and activity previously considered (equation (6)) gives:

$$\frac{\Delta \Pi_t}{1 + \Pi_{t-1}} = \left(A \left(\frac{O_t}{\bar{O}} \right)^{\tau} \right)^{\frac{\phi\nu}{1-\nu}} - 1 \qquad (14)$$

Equation (14) provides the 'accelerationist' result in which it is the *change* in, rather than the level of, the rate of inflation (scaled in this case) on the left-hand side that is positively related to the *level* of activity and other factors affecting the degree of conflict in real income aspirations on the right-hand side. By contrast, the equivalent equation in the first rudimentary model:

$$\Pi_t = \left(A \left(\frac{O_t}{\bar{O}} \right)^{\tau} \right)^{\frac{\nu}{1-\nu}} - 1 \qquad (15)$$

relates the *level* of inflation on the left-hand side to the levels of the variables on the right-hand side. Key to this difference is the incorporation in the variant model of 'integral control' error correction in firms' pricing policy. The correction never succeeds in delivering firms' target price to wage ratio, however, because of the dominance of workers' target wage to price ratio.

It should be added, if it is not self-evident, that an accelerationist result cannot be construed as an equilibrium steady-state. A perpetual periodic increase in the rate of inflation would eventually elicit other changes in price-wage behaviour – such as Rowthorn's 'adaptive mechanism' or Flemming's 'changes of gear' – leading to an unstable hyperinflation and economic collapse.

Conclusion

It is possible that a conventional response to the current inflation would, within a limited period, restore the British economy to its previous low-inflation, full-employment state. Monetary tightening would be a standard way to contain inflation caused by 'too much money chasing too few goods', and, should the exchange rate appreciate as a result, additionally subdue imported inflationary pressure. The cost in terms of the resulting recession and unemployment, more than eliminating the current labour shortage, could prove Hobbesian: nasty, brutish, but at least comparatively short-lived.

The danger, however, is of a more protracted malaise, one in which the economy continues over a number of years to experience too-high inflation and persistently high unemployment: a return to stagflation. This risk arises in part because inflation may have been re-activated as an enduring consideration in workers' and firms' wage and price setting policies, the inflation rate having exceeded Rowthorn's 'critical point' and, in the process, destroying any belief in the authorities' ability to control (or 'anchor') inflation in the longer term. Despite his sceptical view of the importance of 'inflation expectations', Rudd makes a similar point: 'to watch out for any evidence that a renewed concern with price inflation was starting to affect wage determination'.[17] Attempts by the government to protect employment by maintaining the expansion of total money expenditure in these circumstances may recreate the moral hazard that exercised Meade, and fuel an embedded conflict inflation process such as that sketched in this note, with collective real income aspirations unfulfilled and attendant societal unrest. If so, suggestions for more effective competition policies to contain excessive profit aspirations and Meade's proposed solutions for wage-fixing arrangements, aimed at the promotion of jobs rather than pay, would warrant their own revival.

Notes

[1] Needham, 2015, p.104.

[2] Williamson and Wood, 1976, p.528. The other contributors were James Ball and Terence Burns (the future Chief Economic Adviser to the succeeding Conservative government), David Laidler and Marcus Miller.

[3] Healey, 1989, p.378.

[4] Flemming, 1976, p.63.

[5] Phillips, 1958.

[6] For example, Engels (1845), Marx (1867), Phelps (1967), Friedman (1968).

[7] Meade, 1982, p.26.

[8] Ibid, pp.27-28.

[9] Burgess et al., 2013, p.A24.

[10] Lavoie, 2022, Chapter 8.

[11] Bank of England/Ipsos Inflation Attitudes Survey, May 2022. Long run comparisons are affected by changes in survey methodology since May 2020.

[12] Estimate using the Bank of England's seasonally and statistical-break adjusted measure of the money stock that is used as a medium of exchange, 'M4ex', which deducts from the broad money stock measure, M4, the money holdings of certain intermediate 'other financial corporations' that lend to banks and building societies.

[13] Rudd, 2022, p.26.

[14] Lavoie, 2022, Chapter 8, p.593.

[15] Martin and O'Connor, 1981, pp.40-42.

[16] See, for example, Patterson, 1983, p.20.

[17] Rudd, 2022, p.41.

Annex derivations

Derivation A

$$W_t = X^* P_t \tag{A1}$$

$$P_t = \left(P_{t-1}\right)^{1-\nu} \left(Z^* W_t\right)^{\nu} \tag{A2}$$

From (A1) and (A2):

$$P_t = \left(P_{t-1}\right)^{1-\nu} \left(Z^* X^* P_t\right)^{\nu} \tag{A3}$$

Divide (A3) by $P_{t-1} \equiv P_{t-1}^{(1-\nu)} P_{t-1}^{\nu}$:

$$\frac{P_t}{P_{t-1}} = \left(Z^* X^*\right)^{\nu} \left(\frac{P_t}{P_{t-1}}\right)^{\nu} \tag{A4}$$

Divide (A4) by $\left(\frac{P_t}{P_{t-1}}\right)^{\nu}$:

$$\left(\frac{P_t}{P_{t-1}}\right)^{1-\nu} = \left(Z^* X^*\right)^{\nu} \tag{A5}$$

Take the $1-\nu$ root of both side of equation (A5):

$$\frac{P_t}{P_{t-1}} = \left(Z^* X^*\right)^{\left(\frac{\nu}{1-\nu}\right)} \tag{A6}$$

Using the definition $P_t \equiv P_{t-1} + \Delta P_t$, (A6) becomes:

$$\frac{P_{t-1} + \Delta P_t}{P_{t-1}} = 1 + \frac{\Delta P_t}{P_{t-1}} = \left(Z^* X^*\right)^{\left(\frac{\nu}{1-\nu}\right)} \tag{A7}$$

Derivation B

$$P_t = Z^* W_t \tag{B1}$$

Divide (B1) by P_{t-1}:

$$\frac{P_t}{P_{t-1}} = \frac{W_t}{W_{t-1}} \tag{B2}$$

$$W_t = W_{t-1}^{1-u} \left(X^* P_t\right)^{u} \tag{B3}$$

Divide (B3) by W_{t-1} and re-arrange in terms of the current price to wage ratio and the ratio of the current to the previous period wage:

$$\frac{W_t}{W_{t-1}} = \left(X^* \frac{P_t}{W_t} \frac{W_t}{W_{t-1}} \right)^u \tag{B4}$$

Substitute for the current price to wage ratio using equation (B1) and rearrange, using (B2):

$$\frac{P_t}{P_{t-1}} = \left(Z^* X^* \right)^{\frac{u}{1-u}} \tag{B5}$$

Derivation C

$$W_t = X^* P_t \tag{C1}$$

$$P_t = \left(P_{t-1} \right)^{1-v} \left(Z^* W_t \left[\frac{Z^*}{\left(\frac{P_t}{W_t} \right)} \right]^{t\phi} \right)^v \tag{C2}$$

From (C1) and (C2):

$$P_t = \left(P_{t-1} \right)^{1-v} \left(Z^* X^* P_t \left[\frac{Z^*}{\left(\frac{1}{X^*} \right)} \right]^{t\phi} \right)^v \tag{C3}$$

Divide (C3) by $P_{t-1} \equiv P_{t-1}^{(1-v)} P_{t-1}^v$ and re-arrange:

$$\frac{P_t}{P_{t-1}} = \left(\frac{P_t}{P_{t-1}} Z^* X^* \left(Z^* X^* \right)^{t\phi} \right)^v \tag{C4}$$

Divide (C4) by $\left(\frac{P_t}{P_{t-1}} \right)^v$ and rearrange:

$$\frac{P_t}{P_{t-1}} = \left(Z^* X^* \left(Z^* X^* \right)^{t\phi} \right)^{\frac{v}{1-v}} \tag{C5}$$

Derivation D

$$\frac{P_t}{P_{t-1}} = \left(Z^* X^* \left(Z^* X^* \right)^{t\phi} \right)^{\frac{\nu}{1-\nu}} \tag{D1}$$

Lag (D1) by one period:

$$\frac{P_{t-1}}{P_{t-2}} = \left(Z^* X^* \left(Z^* X^* \right)^{(t-1)\phi} \right)^{\frac{\nu}{1-\nu}} \tag{D2}$$

Divide (D1) by (D2):

$$\frac{\left(\frac{P_t}{P_{t-1}} \right)}{\left(\frac{P_{t-1}}{P_{t-2}} \right)} = \frac{\left(Z^* X^* \left(Z^* X^* \right)^{t\phi} \right)^{\frac{\nu}{1-\nu}}}{\left(Z^* X^* \left(Z^* X^* \right)^{(t-1)\phi} \right)^{\frac{\nu}{1-\nu}}} = \left(Z^* X^* \right)^{\frac{\phi\nu}{1-\nu}} \tag{D3}$$

Use the definitions $P_t \equiv P_{t-1} + \Delta P_t$, and $\Pi_t \equiv \frac{\Delta P_t}{P_{t-1}}$:

$$\frac{1+\Pi_t}{1+\Pi_{t-1}} = \left(Z^* X^* \right)^{\frac{\phi\nu}{1-\nu}} \tag{D4}$$

Subtract one from (D4) and simplify:

$$\frac{\Delta\Pi_t}{1+\Pi_{t-1}} = \left(Z^* X^* \right)^{\frac{\phi\nu}{1-\nu}} - 1 \tag{D5}$$

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