Economic Stabilization and Money Supply Endogeneity in a Conflicting Claims Environment

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1 Introduction

This paper illustrates some effects of monetarist policy in a non-monetarist economy. Although it is widely considered that a Friedman (1968) style "k-percent" rule has (weak) optimality properties in a variety of neoclassical settings, theoretical analyses of alternative monetary policies in Post Keynesian macromodels are scarce. We argue that, in a conflicting claims economy, monetary policy rules are a crucial determinant of macroeconomic performance. In particular, we demonstrate that accommodative policies are stabilizing, that monetarist policies are destabilizing, and that stable macrodynamic behavior requires the implementation of activist macropolicy.

The conflicting claims model links inflation directly to distributional conflict: the rate of inflation is determined by the intensity of the struggle over income shares. Perhaps this linkage of inflation to non-monetary variables is responsible for the tendency of this modeling tradition to ignore the role of money and monetary policy in the determination of macroeconomic outcomes.[1] In contrast, this paper explicitly considers the role of monetary policy in a conflicting claims model. The results are striking: explosive instability or eternal business cycles characterize an economy under a monetarist "k-percent" rule, whereas under an

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[1]See, for example, Devine (1974), Dutt (1987), Gough (1975), Rosenberg and Weisskopf (1981), Desai (1973), and Tran (1987). Analyses that explicitly acknowledge a role for money are rare, but see Rowthorn (1977), Burdekin and Burkett (1988, 1990), and Isaac (1990).

appropriately accommodative "validation" rule the economy is stable and free of business cycles. Monetary policy also proves to be an important determinant of income distribution in the short run and the long run.

Section II presents a conflicting claims model of a monetary economy. Section III compares monetarist and validation rules in this economy. Section IV integrates the discussion of Section III into a consideration of more general money supply rules. Section V highlights the role of alternative assumptions about expectations formation. Section VI offers some observations on the steady state properties of the model, and Section VII concludes.

2 Money in a conflicting claims model

Distributional conflict in the conflicting claims model is captured by behavioral parameters that embody the relative ability of the recipients of profits ("capitalists") and the recipients of wages ("workers") to press their income claims. Conflict arises when workers make wage claims that are not compatible with capitalists' claimed rate of profits: total income claimed then exceeds national income, and the result is inflation. This framework is tied closely to the view that "inflation occurs when labor's 'markup' of wages over 'cost' (the cost of living) and capitalists' markup over cost are inconsistent with general price stability; that is, add up to an attempt to take more than 100% of potential output."[2] However the conflicting claims framework does not limit the inflation generating ability of conflicting claims to situations of full employment; rather, the focus is on the compatibility of current claims with current income. Thus the conflicting claims model does not rule out the possibility of stagflation. Whether or not the economy is at full employment, inflation occurs when workers and capitalists press claims in excess of current income. Thus the conflicting claims model recognizes that income claims do not automatically show up as aggregate demand.

We follow Burdekin and Burkett's (1988) characterization of total nominal income claimed as $(W/A)QY_r$, where Y_r is the real income available for distribution, Q is the target gross mark-up of capitalists, A is average labor productivity (real output per labor hour, Y_r/N), and W is the contracted nominal hourly wage of workers. Nominal income claims in logarithms, y_n^c, is therefore

$$y_n^c = (w - a) + q + y_r \tag{1}$$

where lower case letters indicate logarithms.

The basic premise of the conflicting claims model is that nominal income claims in excess of current nominal income generate inflation. That is, representing time derivatives with an overdot,

$$\dot{p} = \gamma[y_n^c - (p + y_r)] \tag{2}$$

[2]The quote is Kahn's (1975,p.271) summary of the views of Ackley (1961).

In equation (2) prices do not move instantaneously to reconcile nominal income claims with nominal income, reflecting the price rigidity that has been documented in advanced industrialized countries.[3] In addition, inflation is not tied directly to nominal wage changes: the conflicting claims model reconciles short run variations with long run constancy of the markup.

Note that q, the target markup claimed by capitalists, and $(w-a)$, the wage claim per unit of output, imply—for a given level of real income—a price level at which nominal income claims can be satisfied: $p^c = (w-a)+q$. When nominal income claims differ from nominal income, p^c also differs from p. Thus we may also write the price adjustment rule in a very natural way, relating price changes to the gap between current prices and the price level desired by capitalists given workers nominal wage claims.

$$\dot{p} = \gamma(p^c - p) \tag{2'}$$

Alternatively, the conflicting claims characterizations of price adjustment is also compatible with the suggestion of Dutt (1987) that inflation is the result of a gap between capitalists' desired and actual profit share, a formulation used by Flaschel and Krüger (1984), Rowthorn (1977), and in Desai's (1973) first modification of the Goodwin (1967) growth cycle model.[4] Suppose capitalists find it costly to be far from their target profit share but also experience increasing costs in the speed of price increases.[5] Then capitalists will find it in their interest to initiate price increases whenever the actual wage share (in logs, $w-p-a$) is greater than their target for the wage share (in logs, $-q$). Letting $\omega \equiv w-p-a+q$, we can rewrite the price adjustment equation in a particularly compact fashion.

$$\dot{p} = \gamma\omega \tag{2''}$$

Workers struggle to maintain or increase their wage share. Following the focus of Devine (1974), Rowthorn (1977), and Burdekin and Burkett (1988) on contractually achieved nominal wage claims, we may capture the behavior of nominal wages in a standard Phillips curve relationship.[6]

$$\dot{w} = \pi + \dot{w}_a^c - \phi(U - \bar{U}) \tag{3}$$

[3]See especially Carlton (1986).

[4]A constant desired profit share implies a constant desired mark-up over unit costs in this model. Motivating this fairly standard Post Keynesian assumption is beyond the scope of the present paper, but see Harris (1978), Naish (1990), and of course Weintraub (1959). Some Post Keynesians, such as Rowthorn (1977), vary the mark-up with the unemployment rate via a Kaleckian link to the level of capacity utilization; inclusion of this effect would not change our results unless it were so strong as to reverse the dependence of the wage share on unemployment that is embodied in the Phillips curve. More often the markup is assumed to be constant even in the short run: Arestis (1989) is a recent example. The conflicting claims model imposes this constancy only in the long run, allowing short run fluctuations. Such short run variability and long run constancy has found strong empirical support in studies on the stability of the wage share: see Klein (1989).

[5]Costs of price adjustment can prevent the immediate adjustment of p to p^c and are thus a crucial component of the price rigidity in this model. A more explicit characterization of such costs can be found in Goldstein's (1985) treatment of the links between relative prices and market share.

[6]As indicated by Skott (1989,Ch.8), this use of the Phillips curve is common but not univer-

In equation (3) the growth of nominal wage claims is determined by anticipated inflation, π, autonomous claims growth, $\dot{w}_a^c$, and the unemployment gap, $U - \bar{U}$.[7] Equivalently, we can write

$$\dot{\omega} = (\dot{w}_a^c - \dot{a}) - \phi(U - \bar{U}) + (\pi - \dot{p}) \qquad (3')$$

in order to highlight the role of expectational errors in determining the movement of relative income shares. Since we wish to keep the model simple so as to focus attention on the monetary policies at issue, we will assume that current information about prices is complete enough that for our purposes expectational errors are negligible: $\pi = \dot{p}$. (See Section IV for alternatives.)

In equation (4) we offer a fairly general characterization of demand determined output. Autonomous aggregate demand is δ_0, shifts of which can represent changes in government expenditure or in the state of the long run expectations of entrepreneurs. Real balances are included in order to capture the Keynes effect and the Pigou effect. Distributional effects on demand are summarized by the influence of ω: an increase in the wage share raises the aggregate demand due to the higher propensity to consume of workers.[8]

$$y_r = \delta_0 + \delta_1(m - p) + \delta_2\omega \qquad (4)$$

Although (4) is a much more general formulation than the simple equation of exchange used by Rowthorn (1977) and Burdekin and Burkett (1988), constraining $\delta_0 = 0$, $\delta_1 = 1$, and $\delta_2 = 0$ yields $y_r = m - p$ and thereby allows ready comparison with these authors.

To close the model, we need only link unemployment to output and characterize monetary policy. We relate output and unemployment with a simple

sal in the conflicting claims literature. Some models drop inflation expectations from the determination of nominal wage movements: see the discussion in Section V. Rowthorn (1977) links the wage share (rather than its change) to the unemployment rate, Flaschel and Krüger (1984) (essentially) multiply $\pi + \dot{w}_a^c$ by a function of current growth (in order to capture the effect of growth on wage aspirations), and Dutt (1987) suggests linking nominal wage movements primarily to the gap between the current real wage and an exogenously fixed target level.

[7] Our reference rate of unemployment, $\bar{U}$, is just the rate that yields no anticipated real wage growth beyond the autonomous component. As noted by Wallich and Stockton (1989), the so-called "natural" rate of unemployment or NAIRU can be expressed as a function of $\bar{U}$.

Autonomous growth in wage claims is often assumed to equal productivity growth in empirical work, and readers more comfortable with that formulation will find it changes nothing of consequence in our analysis. We prefer a more Robinsonian interpretation, however, where autonomous claims growth captures the tendency of real wages to ratchet upward in response to concrete historical conditions that we are attempting to capture in this highly stylized fashion. See the discussion in Harris (1978) and Wallich and Stockton (1989).

[8] In order to simplify the algebra, we omit any dependence of aggregate demand on inflation. The interested reader will find this a straightforward augmentation of our analysis. A positive dependence of aggregate demand on inflation will imply that the economy is explosively unstable under a monetarist rule, but a validation rule can still stabilize the economy. (See the next section.) As an additional simplification, we will generally allow δ_0 to grow at the same rate as full employment income; this too is inconsequential for the thrust of our analysis.

version of Okun's Law.[9]

$$U = y_f - y_r \tag{5}$$

Equations (1)–(5) plus a monetary policy rule form the basic conflicting claims model of this paper. We will be especially interested in two monetary policy rules: the monetarist constant money growth rule and a validation rule that explicitly accommodates any growth in income claims.

3 Monetarist rules vs. validation rules

A. Monetarist Rules in a Conflicting Claims Economy

Consider the basic conflicting claims model characterized by equations (1)-(5) along with the constant money growth rate rule associated with Friedman (1968).

$$\dot{m} = k \tag{6}$$

With full current information, we can concisely summarize the conflicting claims model under this "k-percent" policy rule by the following first order system of two differential equations in U and ω.

$$\dot{U} = -\delta_1 k + \delta_1 \gamma \omega - \delta_2 \dot{\omega} \tag{7}$$

$$\dot{\omega} = \dot{w}_a^c - \dot{a} - \phi(U - \bar{U}) \tag{8}$$

This system has characteristic roots $[\delta_2\phi \pm (\delta_2^2\phi^2 - 4\delta_1\gamma\phi)^{1/2}]/2$, implying that a monetarist policy rule generates explosively unstable macroeconomic behavior. For example, high unemployment generates wage share reductions that reduce demand and raise unemployment. The coupling of distributional effects on aggregate demand with a Phillips curve can often generate such instability: for example, the Asimakopolus (1975) model behaves this way if variations in the mark-up are added in Phillips curve fashion. Yet the destabilizing effects of a monetarist policy do not rest entirely on such effects. This can be seen by setting $\delta_2 = 0$, yielding characteristic roots $\pm(-\delta_1\phi\gamma)^{1/2}$. The implied eternal "boom/bust" cycle, illustrated in Figure 1, is reminiscent of the Goodwin (1967) growth cycle model and extensions of this model such as Desai (1973).

The economy represented in this paper might be considered more realistic than the Goodwin model, in that employment is driven by demand side rather than supply side considerations.[10] In addition, while the Goodwin model follows a classical tradition in stressing the importance of saving propensities in

[9] Our results do not require this particular simplification of Okun's Law, but it provides a consistent link to the rest of the model. Recall that we can write actual worker hours as $N = Y_r/A$ or logarithmically as $n = y_r - a$. Let $\bar{N}$ be the labor force (the "full" employment level of worker hours) and define "full employment output" by $Y_f = A\bar{N}$; we can write $-U = [(N - \bar{N})/\bar{N}] = [(Y_r - Y_f)/Y_f] \approx y_r - y_f$ since $\ln(1 + x) \approx x$. This gives us equation (5).

[10] Capital accumulation is not, however, explicitly modeled. It is already well known that common characterizations of investment behavior can generate business fluctuations, and we wish to avoid conflating these effects with those of monetary policy in this conflicting claims model. That is, we show that even without such effects monetary policy can generate business

the determination of income distribution, this conflicting claims model places emphasis on the role of policy. The rate of growth of the money supply does not effect the basic cyclical character of the macroeconomy, but it does affect the center around which the economy cycles: more expansionary monetary policy (higher k) shifts the distribution of income toward the workers (raises steady state ω).

[**FIGURE 1 ABOUT HERE**]

The dynamic behavior of the conflicting claims model illustrated in Figure 1 embodies a plausible story. Beginning at a business cycle trough, point A in the figure, we find that high unemployment has diminished the bargaining power of labor to the point that the wage share is in decline. The falling wage share eases inflationary pressure, and declining inflation is eventually expansionary given the constant growth rate of the money supply. It is interesting that at point B capitalists experience a mid-cycle profit squeeze, as in Goldstein (1985); the economic expansion induced by the falling wage share and declining inflation eventually reduces unemployment to such an extent that workers are once again able to enforce wage claims in excess of the capitalists' target for the wage share. This new inflationary pressure does not immediately kill the expansion, but eventually distributional conflict grows intense enough to induce a contraction (point C). Workers nevertheless continue to successfully press their wage claims for some time, but eventually unemployment pressures circumscribe their bargaining power (point D). The contraction continues, but a rising profit share and falling inflation are setting into motion the forces that will begin the cycle anew.

This monetarist business cycle indicates that the conflicting claims model does not side with those who argue that "there can be no inflation that is not validated by public policy" (Kahn,1975,p.271), except as a statement about the average behavior of the economy across business cycles. There is no simple short run relationship between money growth (or even lagged money growth) and the rate of inflation. Although it is true that the steady state inflation rate does depend on the money growth rate, the actual inflation rate cycles around this steady state despite the absence of any fluctuations in $\dot{m}$.

B. Validation Rules in a Conflicting Claims Economy

Despite the popularity of constant (often zero) money supply growth as an assumption in conventional macromodels, there is little evidence that a simple monetarist 'k-percent rule' has ever characterized monetary policy in any advanced industrialized economy. In contrast with its limited empirical relevance, however, Friedman's monetarist rule has achieved enormous normative status within the economics profession. This state of affairs raises a question central to this paper: are endogenous money supply rules inherently inferior to monetarist prescriptions in a conflicting claims model?

cycles. This seems particularly important, as Skott (1989,p.52) notes about the specification of the investment function, since "no consensus exists even within individual schools of thought . . . results which depend heavily on a particular specification of the function must be suspect."

Burdekin and Burkett (1988) compare a monetarist rule with the monetary accommodation of income claims, which they call a validation rule. They present some qualified arguments that their conflicting claims model weighs against the validation rule. Any support for the Friedman rule in a conflicting claims framework is rather provocative, especially in light of the results above. However, Isaac (1990) illustrates a number of difficulties with the Burdekin and Burkett analysis and argues that the relative merits of monetarist rules and validation rules in a conflicting claims economy remain arguable.

Adequate characterization of a validation rule is an important first step in accommodating at least some aspects of the literature on the endogenous supply of money, as when Devine (1974,p.87) argues that the "expansion of the money supply is essentially a symptom, rather than a cause, of inflation." Concern with the endogenous supply of money pervades the Post Keynesian literature, as discussed by Moore (1988), and is even a recurrent (if muted) theme in the neoclassical tradition, as in Olivera (1971), Calvo (1979), and even Friedman (1987). In this section, the monetary authority validates increases in income claims according to

$$\dot{m} = Z\dot{y}_n^c \tag{9}$$

where Z is the validation rate. Given a constant validation rate, we can characterize our conflicting claims economy by the first order system of differential equations (8) and (10).

$$\dot{U} = [\delta_1\gamma(1-Z)/(1-\delta_1 Z)]\omega - [(\delta_1 Z+\delta_2)/(1-\delta_1 Z)]\dot{\omega} \tag{10}$$

It is easy to see that macroeconomic dynamics under a validation rule are very different from those under a monetarist rule. Whereas a monetarist rule produces explosive macroeconomic instability, a validation rule need not. The characteristic roots $\{\phi(\delta_1 Z+\delta_2)/(1-\delta_1 Z) \pm [\phi^2(\delta_1 Z+\delta_2)^2/(1-\delta_1 Z)^2 - 4\phi\delta_1\gamma(1-Z)/(1-\delta_1 Z)]^{1/2}\}/2$ indicate that stability depends crucially on the validation rate. Macroeconomic behavior is therefore dramatically affected by the choice of the validation rate, and in an apparently surprising fashion: at low validation rates the system is unstable, while at high validation rates the system is stable.

The basic intuition for this result can be most simply demonstrated under the restrictions $\delta_0 = 0$, $\delta_1 = 1$, and $\delta_2 = 0$, yielding characteristic roots $\{Z/(1-Z) \pm [Z^2/(1-Z)^2 - 4\gamma/\phi]^{1/2}\}\phi/2$. Recall that the restriction $\delta_2 = 0$ implied recurrent business cycles under the monetarist rule; this result re-emerges as expected under complete non-accommodation ($Z = 0$). New macroeconomic behavior emerges, however, when there is some validation of income claims. Figure 2 illustrates the macrodynamics of the conflicting claims economy under a non-accommodative validation rule ($0 < Z < 1$) and under an accommodative validation rule ($Z > 1$).[11] The $\dot{U} = 0$ isocline is drawn as implied by (8), and

[11] It is worth noting that $Z = 1$ is not a feasible validation rule, for it would require that the money supply grow at the same rate as nominal income claims. Under the constraints $\delta_0 = 0$, $\delta_1 = 1$, and $\delta_2 = 0$, however, nominal income grows at the same rate as the money supply. Unless the wage share is constant, however, nominal income claims do not grow at the same rate as nominal income. This is not just an artifact of the simple demand relationship we have

the slope of the $\dot{\omega} = 0$ isocline can be determined from (8) and (10). Under the non-accommodative policy rule, the behavior of the economy is explosively unstable. In this sense we can say that non-accommodative monetary policy ($Z < 1$) is destabilizing in a conflicting claims economy. However, a validation rate greater than unity stabilizes the economy. In fact, for validation rates slightly greater than unity, the economy will not exhibit any real business cycle behavior: convergence to the steady state will be monotonic or half cyclic. (Larger values for the validation rate may generate damped cyclical behavior.)

[FIGURE 2 ABOUT HERE]

The solution for the implied money growth rate offers an intuitive explanation for this result.

$$\dot{m} = \{[\bar{U} + (\dot{w}_a - \dot{a})/\phi] - U\}\phi Z/(1 - Z) \tag{11}$$

As shown in Section VI, the steady state unemployment rate is $\bar{U} + (\dot{w}_a^c - \dot{a})/\phi$. With a validation rate greater than unity, monetary policy tends to be expansionary whenever unemployment is above its steady state and contractionary whenever it is below its steady state. Thus we find in the accommodative case illustrated in Figure 2 that the $\dot{U} = 0$ locus is positively sloped—since maintaining a constant high unemployment rate requires more inflation, and therefore a higher wage share, to offset the money growth implied by (11)—and the adjustment dynamics are stable. Thus an accommodative validation rule is stabilizing because it is an activist countercyclical policy. This section is not simply suggesting that activist countercyclical policy can be stabilizing, however. The implication is much stronger: activist countercyclical policy is *required* for stable macrodynamic behavior in a conflicting claims economy. In the next section, our derivation of the money supply rule implied by a validation rule will allow us to buttress this point in terms of the traditional literature on money supply reaction functions.

4 Money supply rules

Perceptions of the legitimate concerns of monetary policy changed in the 1980s. Inflation control emerged as the primary goal of monetary policy, while employment concerns either receded or lost their status as a legitimate object of monetary policy. At the extremes of this shift, the early 1980s saw a renewed emphasis on strict monetary growth targeting. This section examines the results of these different policy emphases in a conflicting claims economy by introducing a

chosen, but rather it more generally reflects the influence of real money balances on demand. (In the general model, the problem arises at $\delta_1 Z = 1$.) Thus we cannot ask how the economy would behave if the central bank adopted a unitary validation rate. As argued in Isaac (1990), such a policy goal would be "irrational" in the sense the structure of the economy logically excludes the achievement of the goal.

money supply rule that embodies both inflation and unemployment concerns.[12]

$$\dot{m} = \mu_0 + \mu_1(U - \bar{U}) - \mu_2\dot{p} \tag{12}$$

Given the results of Section III, we can characterize the validation rule as well as the Friedman rule in terms of (12). The Friedman rule is an obvious special case, with $\mu_0 = k$ and $\mu_1 = \mu_2 = 0$. The validation rule is also a special case, as can be seen by comparing equation (11) to equation (12), with $\mu_0 = (\cot w_a^c - \dot{a})Z/(1-Z)$, $\mu_1 = -\phi Z/(1-Z)$, and $\mu_2 = 0$.[13]

When the money supply rule is (12), the dynamic evolution of our conflicting claims economy is governed by the first order system of differential equations consisting of the Phillips curve (8) and the new employment adjustment equation (13).

$$\dot{U} = -\delta_1\mu_0 + \delta_1\mu_1\bar{U} - \delta_1\mu_1 U + \delta_1(1+\mu_2)\gamma\omega - \delta_2\dot{\omega} \tag{13}$$

The characteristic roots of this system are $\{-(\delta_1\mu_1 - \delta_2\phi) \pm [(\delta_1\mu_1 - \delta_2\phi)^2 - 4\delta_1(1+\mu_2)\gamma\phi]^{1/2}\}/2$. As always, stability requires that these roots have negative real parts. Confirming the lessons learned in examining the validation and monetarist rules in Section III, responsiveness of money supply growth to the unemployment rate (high μ_1) tends to be stabilizing but changes in the exogenous component of money growth (μ_0) have no effect on the stability characteristics of the model. Once again we find that macrodynamic stability of the conflicting claims economy requires that monetary policy be sensitive to the unemployment rate.

In addition, it now appears that inflation induced monetary restraint ($\mu_2 > 0$) is not stabilizing. In fact, in an economy that would otherwise exhibit no intermediate run macroeconomic cycles, increases in the sensitivity of monetary growth to inflation (higher μ_2) will eventually induce damped cycles. Intuitively, monetary policy that is highly sensitive to current inflation tends to push the unemployment rate around too quickly relative to movement in the wage share

[12]See Blanchard and Fischer (1989,chapter 11) for a more detailed discussion of the standard motivation of this general type of policy rule. Interest rates do not enter as a separate target, as they are generally taken to be intermediate to ultimate inflation and unemployment goals.

It should be clear that this paper does not assume the controversial extreme horizontalist position that has been associated with Moore (1988). As pointed out by a referee for this paper, a simplified horizontalist view of central bank behavior—supplying any amount of money that is demanded at a pegged interest rate—involves a somewhat different notion of money supply endogeneity than that used in this paper. In particular, the money supply would no longer be predetermined but rather would be endogenously determined at each point in time. In order to consider this case, it is useful to explicitly consider the goods and money market equations that underlie the reduced form characterization of aggregate demand given in (4). Interest rate pegging can then generally be shown to be destabilizing in our conflicting claims model. To see this, consider the case $\delta_2 = 0$ under a particularly simple characterization of money market clearing that links interests rates and the income velocity of money: $i = \mathrm{h}(p + y_r - m)$. Pegging the interest rate will then imply that monetary policy is sensitive to inflation but not to unemployment, a policy which does not meet the requirements for stability (as shown in this section).

[13]In the general model, we would set $\mu_0 = [(1+\delta_2)(\dot{w}_a^c - \dot{a}) + \dot{y}_f]Z/(1-\delta_1 Z)$, $\mu_1 = -\phi(1+\delta_2)Z/(1-\delta_1 Z)$, and $\mu_2 = (1-\delta_1)Z/(1-\delta_1 Z)$.

to settle into the steady state in less than a cycle. Consider for example the accommodative case illustrated in Figure 2; sensitivity of monetary policy to the inflation rate would show up as a flatter $\dot{U} = 0$ isocline and corresponding (damped) cyclical movements in U and ω.

In the absence of a monetary policy response to the unemployment rate ($\mu_1 = 0$), the economy will be explosively unstable, as suggested by our work in Section II. (Similarly, restricting $\delta_2 = 0$ then yields eternal business cycles, regardless of the responsiveness of monetary policy to the inflation rate.) The only component of monetary policy that is stabilizing is the part that actively combats unemployment. Corresponding to this observation, a validation rule can stabilize a conflicting claims economy when it is equivalent to an adequately activist countercyclical policy. The more general money supply function of this section clarifies the virtues of such validation rules and the weaknesses of monetarist alternatives.

5 Expectations

Up to now, this paper has assumed that full current information informs the wage bargain so that inflation is fully anticipated. In a monetary business cycle model, this assumption may be very reasonable. Disaggregated price data are observed at very high frequencies by workers in their role as consumers, and aggregate price indices are announced monthly. The time taken to correct current price expectations is therefore arguably negligible relative to the length of the business cycle, a point that has been raised repeatedly against the New Classical models that generate business cycle phenomena by relying on price misperceptions. Expectational errors can have a persistent influence on the contracted wage, however, if long term contracts are less than fully indexed—some of the New Keynesian models, which adopt the New Classical treatment of expectations, retain price misperceptions as a source of business cycles in this fashion. While accepting the validity of the central insight that expectations revisions are not always fully reflected in current economic arrangements, Post Keynesians have rejected the oversimplified treatment of behavior under uncertainty required for the New Keynesian formalisms.

To date, no consensus has emerged as to the most reasonable characterization of inflation expectations. Instead, three basic expectations assumptions dominate formal models in the Post Keynesian tradition: the full current information assumption, the static expectations assumption that expectations are exogenously fixed over the model's horizon, and the adaptive expectations assumption that expectations adjust in response to current misperceptions. Our view is that the full current information assumption is most appropriate to business cycle analysis, but we wish to acknowledge that the results of Sections II-IV are somewhat sensitive to to the expectations assumption chosen. The present section therefore briefly explores the implications of the static and adaptive expectations assumptions in the conflicting claims model.

A. Static Expectations

Under the assumption of static expectations, π is exogenously fixed. In this case (3') cannot be reduced to (8). Instead, using (2") and (3'), we get

$$\dot{\omega} = (\dot{w}_a^c - \dot{a}) + \phi\bar{U} - \phi U + \pi - \gamma\omega \tag{8'}$$

Combining (8') with the unemployment adjustment equation (13), and thereby with the general money supply rule (12), we get a first order system of differential equations with characteristic roots $\{-(\gamma+\delta_1\mu_1-\delta_2\phi)\pm[(\gamma+\delta_1\mu_1-\delta_2\phi)^2-4\delta_1(1+\mu_2)\gamma\phi-4\delta_1\mu_1\gamma]^{1/2}\}/2$. Thus under static expectations the system can be stable even under the monetarist rule ($\mu_1 = \mu_2 = 0$), as long as distributional effects on aggregate demand are small.[14] Static expectations are stabilizing because they imply that capitalists can successfully pull the carpet out from under workers by raising prices; whenever a high wage share generates distributional conflict, capitalists can surreptitiously (i.e., unexpectedly) reassert their income claims by raising prices. In this case, "inflation has served as a vent for distributional strife, an escape hatch through which excess demands are automatically channeled,"[15] and capitalists can win the struggle over distribution while workers believe the opposite is happening.

Some Post Keynesian writings assume that the Phillips curve relates changes in money wages to the unemployment rate independently of inflation expectations. This assumption is formally equivalent to a static expectation of $\pi = 0$, so identical caveats apply. If full current information is a better characterization of inflation expectations, as we have argued, such practice may generate extremely misleading characterizations of macroeconomic dynamics and, in particular, may mischaracterize the virtues of competing monetary policies.

B. Adaptive Expectations

The adaptive expectations hypothesis is that expectations adjust in response to current misperceptions.

$$\dot{\pi} = \lambda(\dot{p} - \pi) \tag{14}$$

Combining (14) with (13) and (8'), we get the conflicting claims model under adaptive expectations. Since (14) introduces additional dynamics to the model, the analysis becomes somewhat more complex than in the static expectations and full current information models. Nevertheless, as long as distributional effects on aggregate demand are small, the model may once again be stable–even under monetarist policies ($\mu_1 = \mu_2 = 0$).[16] The reason for this stability parallels that in the static expectations model: workers can be tricked by unanticipated inflation into yielding income share to capitalists. In such an environment, an adequate monetary policy response to the unemployment rate ($\mu_1 > \delta_2\phi/\delta_1$) can always stabilize the economy.

[14] Under the monetarist rule we need $\gamma > \delta_2\phi$ for stability, and this is sufficient in the general case. If this condition is not met, a monetary policy response to the unemployment rate will be necessary to stabilize the economy.

[15] Hirsch (1978,p.270).

[16] An appendix to this paper, which contains the algebraic detail for the model, is available from the author by request.

6 Characteristics of the steady state

Although there are a variety of views on the appropriate characterization of inflation expectations over the business cycle, general agreement exists that $\pi = \dot{p}$ in the steady state. In the conflicting claims model under the general money supply rule, the steady state values U^s and ω^s can therefore be determined by setting $\dot{\omega} = 0$ and $\dot{U} = 0$ in (8) and (13). This yields

$$U^s = \bar{U} + (\dot{w}_a^c - \dot{a})/\phi \tag{15}$$

$$\omega^s = [\mu_0 + \mu_1(\dot{w}_a^c - \dot{a})/\phi]/(1 + \mu_2)\gamma \tag{16}$$

Since the wage share is constant in the steady state, the Weintraub (1959) aggregate price equation ($\dot{p} = \dot{w} - \dot{a}$) emerges as a long run property of the model. Thus the conflicting claims model supplements Eichner's (1989) motivation of the Weintraub aggregate price equation as a long run relationship.

The steady state level of unemployment is independent of the monetary policy parameters, but these parameters are crucial determinants of the steady state distribution of income. An "inflation fighting" policy stance (high μ_2) shifts the steady state distribution of income toward capitalists. The effect of policy sensitivity to unemployment (high μ_1) on the steady state distribution of income, on the other hand, is ambiguous: such a policy stance increases labor's long run share if and only if workers are "aggressive" in the sense that the autonomous growth in wage claims exceeds productivity growth.

7 Conclusion

In a conflicting claims economy, monetarist policies are inferior to accommodative validation rules and to traditional activist policies. Monetarist policy is not stabilizing in this non-monetarist economy, but appropriately activist policy is. We show that an accommodative validation rule can be appropriately activist, does not introduce indeterminacy in the model, and can eliminate the macroeconomic instabilities and business cycle behavior induced by a monetarist rule. In fact, an accommodative validation rule is required for macrodynamic stability. These basic lessons are reaffirmed when we embed the k-percent rule and the validation rule in a more general money supply rule. In addition, we show that when inflation concerns loom large in the minds of central bankers, their behavior will tend to shift the distribution of income away from workers. Given the changing views of monetary policy that characterized the 1980s, this lesson serves as a cautionary note of contemporary relevance.

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9 APPENDIX

This appendix analyzes the conflicting claims model, with the general money supply rule, under adaptive expectations. The model can be boiled down to the money supply rule (12), the wage adjustment rule (8'), the price adjustment equation (2"), demand determined output (4), Okun's law (5), and adaptive expectations (14) in the text. We reproduce these here as (A.1)-(A.6).

$$\dot{m} = \mu_0 + \mu_1(U - \bar{U}) - \mu_2\dot{p} \tag{A.1}$$
$$\dot{\omega} = \dot{w}_a^c - \dot{a}) + \phi\bar{U} - \phi U + \pi - \dot{p} \tag{A.2}$$
$$\dot{p} = \gamma\omega \tag{A.3}$$
$$y_r = \delta_0 + \delta_1(m - p) + \delta_2\omega \tag{A.4}$$
$$U = y_f - y_r \tag{A.5}$$
$$\dot{\pi} = \lambda(\dot{p} - \pi) \tag{A.6}$$

Here $\omega = w - p - a + q$, w =nominal wage, p =price level, a =worker productivity, q =target mark-up, y_r =real income. π =expected inflation, $\dot{w}_a^c$ =autonomous wage claims growth, $\bar{U}$ =reference unemployment rate (at which autonomous wage growth is the only expected real wage growth), m =money supply. Lower case letters imply logarithms. Recall that a, y_f, $\bar{U}$, and w_a^c are predetermined and exogenous while m, p, π, and ω are predetermined but endogenous. Thus y_r, U, $\dot{m}$, $\dot{p}$, $\dot{\pi}$, and $\dot{\omega}$ are endogenously determined at any point in time as

$$y_r = \delta_0 + \delta_1(m - p) + \delta_2\omega \tag{A.7}$$
$$U = y_f - \delta_0 - \delta_1(m - p) - \delta_2\omega \tag{A.8}$$
$$\dot{p} = \gamma\omega \tag{A.9}$$
$$\dot{m} = \mu_0 - \mu_1\bar{U} + \mu_1[y_f - \delta_0 - \delta_1(m - p) - \delta_2\omega] - \mu_2\gamma\omega \tag{A.10}$$
$$\dot{\pi} = \lambda(\gamma\omega - \pi) \tag{A.11}$$
$$\dot{\omega} = \dot{w}_a^c - \dot{a}) + \phi\bar{U} - \phi[y_f - \delta_0 - \delta_1(m - p) - \delta_2\omega] + \pi - \gamma\omega \tag{A.12}$$

The stability of this system can be analyzed directly, but it simplifies the algebra greatly to note that (A.8) implies

$$\dot{U} = -\delta_1(\dot{m} - \dot{p}) - \delta_2\dot{\omega} \tag{A.13}$$

under the assumption that autonomous aggregate demand grows at the same rate as potential output in the economy. (We make this assumption because of its plausibility, but dropping it would simply add a constant term into the algebra and would not affect any of our qualitative results or conclusions.) We can substitute (A.8), (A.9) and (A.10) into (A.13) to get

$$\dot{U} = -\delta_1\mu_0 + \delta_1\mu_1\bar{U} - \delta_1\mu_1 U + \delta_1(1 + \mu_2)\gamma\omega - \delta_2\dot{\omega} \tag{A.14}$$

which is equation (13) in the text. Similarly, we can rewrite (A.12) as

$$\dot{\omega} = (\dot{w}_a^c - \dot{a}) + \phi\bar{U} - \phi U + \pi - \gamma\omega \tag{A.15}$$

which was equation (8') in the text. Thus it is possible to analyze the economy's dynamics in terms of the three equation first order system comprising (A.14), (A.15), and (A.11). The characteristic equation of this system is

$$\begin{aligned} &D^3 + (\lambda + \gamma + \delta_1\mu_1 - \delta_2\phi)D^2 \\ &\quad + [\delta_1\mu_1(\lambda + \gamma) + \delta_1(1 + \mu_2)\gamma\phi - \delta_2\phi\lambda]D \\ &\quad + \lambda\delta_1(1 + \mu_2)\gamma\phi = 0 \end{aligned} \tag{A.16}$$

Consider the case when $\delta_2 = 0$. All the coefficients are positive, so the necessary and sufficient condition for stability is $(\lambda+\gamma+\delta_1\mu_1)[\mu_1(\lambda+\gamma)+(1+\mu_2)\gamma\phi]-\lambda(1+\mu_2)\gamma\phi > 0$ (see Gantmacher [1959, Ch.15]), which is always satisfied. Thus the conflicting claims model is stable under the adaptive expectations hypothesis, even under a monetarist rule ($\mu_1 = \mu_2 = 0$), as long as distributional effects on aggregate demand are small enough. More generally, however, a sensitivity of monetary policy to the unemployment rate will be required to stabilize the economy. A simple sufficient condition for stability is that $\mu_1 > \phi\delta_2/\delta_1$.

The static expectations and full information results in the text can be derived as limiting cases of adaptive expectations. Setting $\lambda = 0$ in (A.16) and factoring out the zero root (which corresponds to a constant in the system solution), we get the characteristic equation for the static expectations case.

$$D^2 + (\gamma + \delta_1\mu_1 - \delta_2\phi)D + \delta_1\mu_1\gamma + \delta_1(1 + \mu_2)\gamma\phi = 0 \tag{A.17}$$

This can easily be solved via the quadratic equation for the roots reported in the text. Dividing both sides of (A.16) by λ and taking the limit as $\lambda \to \infty$ yields the characteristic equation for the full current information case.

$$D^2 + (\delta_1\mu_1 - \delta_2\phi)D + \delta_1(1 + \mu_2)\gamma\phi = 0 \tag{A.18}$$

This too is readily solved for the roots reported in the text. The results reported for the monetarist and validation rules can be reproduced by substituting appropriate values for the money supply function parameters. (These values are provided in Section IV.)

Figures

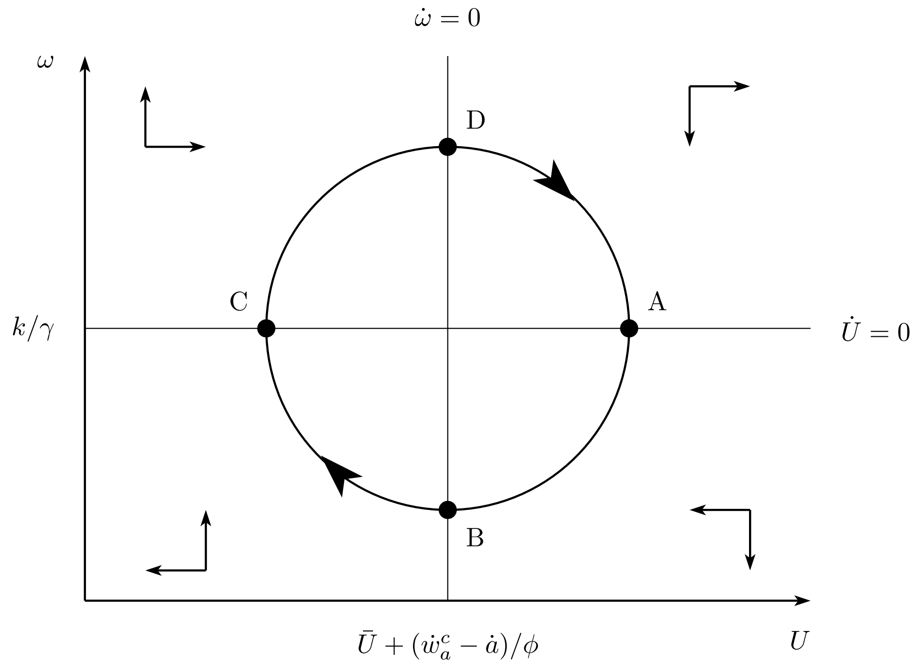

Figure 1: Monetarist Business Cycles

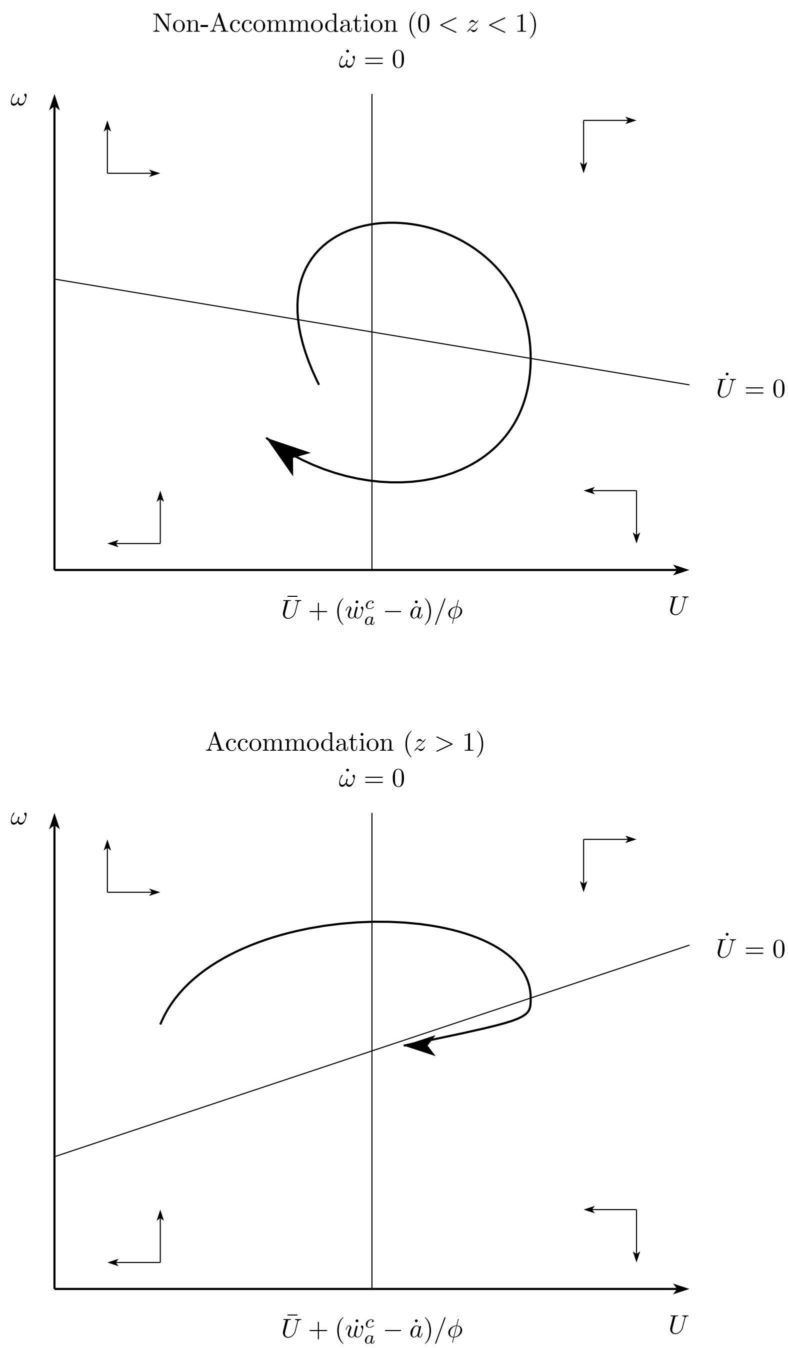

Figure 2: Macroeconomic Behavior under Validation Rules

Summary of Equations from the Article Text

Y_r is real income

Q is the target gross mark-up of capitalists,

A is average labor productivity (real output per labor hour, Y_r/N)

W is the contracted nominal hourly wage of workers.

Y_n^c is nominal income claims

$Y_n^c = (W/A)QY_r$

$$y_n^c = (w - a) + q + y_r \tag{1}$$

where lower case letters indicate logarithms.

The Conflicting Claims Hypothesis

$$\dot{p} = \gamma[y_n^c - (p + y_r)] \tag{2}$$

p^c is price at which nominal income claims can be satisfied

$p^c = (w - a) + q$

$$\dot{p} = \gamma(p^c - p) \tag{2'}$$

ω is the gap between capitalists desired and current income share

$\omega \equiv w - p - a + q$

$$\dot{p} = \gamma\omega \tag{2''}$$

Phillips Curve

$$\dot{w} = \pi + \dot{w}_a^c - \phi(U - \bar{U}) \tag{3}$$

$$\dot{\omega} = (\dot{w}_a^c - \dot{a}) - \phi(U - \bar{U}) + (\pi - \dot{p}) \tag{3'}$$

Full Current Information

$\pi = \dot{p}$

Demand Determined Output

$$y_r = \delta_0 + \delta_1(m - p) + \delta_2\omega \tag{4}$$

$\delta_0 = 0$, $\delta_1 = 1$, and $\delta_2 = 0$ yields $y_r = m - p$

Okun's Law

$$U = y_f - y_r \tag{5}$$

Monetarist Rule and Resulting System

$$\dot{m} = k \tag{6}$$

$$\dot{U} = -\delta_1 k + \delta_1 \gamma \omega - \delta_2 \dot{\omega} \tag{7}$$

Validation Rule and Resulting System

$$\dot{m} = Z \dot{y}_n^c \tag{9}$$

$$\dot{\omega} = \dot{w}_a^c - \dot{a} - \phi(U - \bar{U}) \tag{8}$$

$$\dot{U} = [\delta_1 \gamma (1 - Z)/(1 - \delta_1 Z)]\omega - [(\delta_1 Z + \delta_2)/(1 - \delta_1 Z)]\dot{\omega} \tag{10}$$

$$\dot{m} = \{[\bar{U} + (\dot{w}_a - \dot{a})/\phi] - U\}\phi Z/(1 - Z) \tag{11}$$

"General" Money Supply Rule and Resulting System

$$\dot{m} = \mu_0 + \mu_1(U - \bar{U}) - \mu_2 \dot{p} \tag{12}$$

$$\dot{\omega} = \dot{w}_a^c - \dot{a} - \phi(U - \bar{U}) \tag{8}$$

$$\dot{U} = -\delta_1 \mu_0 + \delta_1 \mu_1 \bar{U} - \delta_1 \mu_1 U + \delta_1 (1 + \mu_2)\gamma \omega - \delta_2 \dot{\omega} \tag{13}$$

Characteristics of the steady state

$$U^s = \bar{U} + (\dot{w}_a^c - \dot{a})/\phi \tag{15}$$

$$\omega^s = [\mu_0 + \mu_1(\dot{w}_a^c - \dot{a})/\phi]/(1 + \mu_2)\gamma \tag{16}$$

$$\dot{p} = \dot{w} - \dot{a}$$