The Role of Expectations in the Choice of Monetary Policy

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There has probably never been a consensus among economists about the role of expectations in formulating monetary policy. Today two widely different views seem to dominate policy research and practice. One view, which I will refer to here as the "new classical macroeconomic" view, is that expectations overwhelm the influence of monetary policy, so that even a sudden change in policy, if expected, will have no real effect on the economy. Sometimes simply, but not quite accurately, called "rational expectations," this view implies that a dramatically quick disinflation could be achieved without recession, and also that monetary policy is ineffective in stabilizing output and employment. The other view, which I will refer to here as the "Keynesian" view, is that expectations matter little, either because they are exogenous, or because people are backward-looking and do not adjust to expectations of policy change. This view is embodied in most econometric models now used for policy evaluation in practice. It implied that unemployment could be permanently reduced by an increase in inflation, and more recently that accommodative monetary policies could prevent recessions by tolerating negligible and temporary increases in inflation.[1]

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1. Some brief discussion of the reasons for my calling these two views "new classical" and "Keynesian" is probably in order. The terminology is not entirely satisfactory because these names have been used in other contexts and have many connotations. However, the term "new classical macroeconomics" seems appropriate because it has already been used by Lucas and Sargent (1978) and others in reviewing macroeconomic developments and because it emphasizes a similarity with the classical economists who freauentlv relied on the flexible-price market-clearing assumptions. Usage of the term "rational expectations" to refer to this view, though widespread, is inaccurate because rational expectations methods have been used in other contexts, as will be described below. The term "Keynesian" seems appropriate because Keynes himself emphasized the random exogeneity of expectations in Chapter 19 of the General Theory and because the major Keynesian econometric models use backward-looking expectations in their analysis.

The main theme of this paper is that both these views are incorrect and can be seriously misleading to policymakers. In developing this theme, I will review some of the criticism which has been raised against these two views, and also attempt to advance a new view of the role of expectations that is emerging from current research. I argue that the new view offers policymakers a promising alternative to the other two views. This new view recognizes that infrequently-changed contractual and institutional arrangements are an important part of the workings of a modern economy, but that forward-looking expectations influence how these arrangements are set up, and how they adjust over time. Expectations cannot be ignored, but neither can the wage and price setting mechanisms through which the economy adjusts. Since this alternative view mixes elements of both the Keynesian and new classical schools, there is a sense in which it is a compromise or consensus view. It would be inaccurate for me to characterize it this way, however, for strong criticism of the approach has already emerged from proponents of both the Keynesian and new classical macroeconomics. In general, the approach has led to policy implications that are quite unlike either the Keynesian or new classical prescriptions. For some questions, the answers seem closer to those of the Keynesians. For others, the answers seem closer to the new classicals. Perhaps more importantly, the approach has also generated econometric policy evaluation models for monetary policy that are quite different from those appearing in earlier work on rational expectations or used by Keynesian economists today. These developments are described below.

In discussing these views, it will be useful to narrow the focus on two objectives of monetary policy. One is the short-run objective of disinflation — bringing the rate of inflation down to a lower level — which is of central concern in the U.S. and other countries today. The other is the long-run objective of keeping the rate of inflation near this new lower level, while at the same time stabilizing the fluctuations of unemployment and output. Of course, this short-run versus long-run dichotomy is artificial. Indeed, expectations about the success of achieving the long-run goal have implications for success in the short-run goal; if people expect a resurgence of inflation soon after the economy recovers from a disinflation, then the disinflation process itself will be more disruptive as these expectations prevent the adjustment of interest rates and other prices.

The paper proceeds as follows. First, I present a brief historical overview of recent research on expectations in macroeconomics. An attempt is made to outline the general implications of the empirical work which has aimed to test the new classical macroeconomic view. I then go on to review the theoretical and empirical research which underlies the new approach to expectations advanced here. Several theoretical models using this approach were introduced independently by different researchers in the mid-1970s and have already been extended in a number of directions. Empirical work began later, but is now being pursued at the micro and macro levels. Testing of the newer approach is still underway.

Second, I review a number of criticisms of the new approach that have been raised by Keynesian and new classical economists. Some of the criticisms have resulted from semantic confusions, but most are substantive and require careful consideration.

Third, I illustrate, using some of my own research, how the new approach leads to workable empirical policy evaluation models that answer questions about the role of expectations. Though these expectations models are still under development, actual policy simulations are useful for assessing their potential as a policy evaluation tool. Using a quantitative model of union wage setting in the U.S., the maximum speed of disinflation which can occur without a recession is calculated under alternative assumptions about indexing and about the composition of contracts in the U.S. labor force. For these calculations, expectations are assumed to be rational. Deviations from rationality caused either by credibility problems or by difficulties in learning about policy would require further adjustment. Despite rational expectations, the speed is considerably slower than that implied by a new classicial view. Disinflating more quickly than the speed calculated here would cause a recession. The results of this simulation are then compared with the results of the current disinflation effort in the U.S. In addition to showing how the new view of expectations generates conclusions which are quite different from Keynesian and new classical models, these simulations are suggestive of some of the credibility problems that arise during the transition period of a disinflation. They also illustrate how policy evaluation of such substantive issues might proceed quantitatively.

In the final section I consider some of the long-run issues. Though the new approach indicates that quick short-run disinflation efforts are

likely to be costly in terms of recession, it also suggests that a long-run policy of less accommodation to inflation than experienced in the U.S. in the 1970s, can lead to price stability and, while not eliminating business cycle fluctuations entirely, can keep them reasonably small. The choice of how accommodative policy should be is ultimately a value judgement. But the claim that a less accommodative policy could eventually lead to a relatively attractive position on the tradeoff between output and price stability, relies heavily on the role of expectations. The simulations and more general arguments that show that a costly disinflation — such as the one we are now observing — is not inconsistent with endogenous forward-looking expectations, are therefore an important part of the case for less accommodative policies.

I. Monetary Economics and Rational Expectations: An Overview

It is now over ten years since an explicit method of analyzing endogenous or consistent expectations was introduced to macroeconomics under the name rational expectations.[2] The original motivation came from the research of Edmund Phelps and Milton Friedman, which had uncovered an important difference between the long-run and the short-run in the tradeoff between inflation and unemployment.[3] Focusing on the Phillips curve — the graphical characterization of the short-term procyclical behavior of prices and wages observed for over a hundred years — Phelps and Friedman showed how simple economic principles would be violated if the curve was extrapolated to the long-run: a permanent increase in inflation would not lead to a permanent increase in production. Their explanation was, of course, based on expectations. The short-run stimulating effects associated with a rise in prices and the depressing effects associated with a fall in prices could not last in the long-run. Firms and workers would come to expect these movements and adjust their behavior accordingly. The fact that the Phelps-Friedman prediction seemed to come true so vividly in the 1970s clearly sheds serious doubt on the view that expectations are exogenous. But while the Phelps-Friedman theory was explicit about the long-run, it was only sketchy about what caused

2. Lucas (1972a, 1972b)
3. Phelps (1967), and Friedman (1968).

the short-run business cycle correlations which generated Phillips' original regression estimates.[4]

A. The new classical macroeconomics

In introducing rational expectations to the problem, Robert Lucas had the main objective of developing a detailed theory of the short-run process which was as explicit as the Phelps-Friedman theory about the long-run. Such detail — however abstract and technical — is of course necessary for quantitative policy analysis and for empirical work. The models introduced by Lucas are explicit about many things in addition to expectations. They are explicit that prices and wages are perfectly flexible and that markets clear at every date. And they are explicit that the mechanism generating the inflation-unemployment correlations is information-based: confusion about relative versus aggregate price movements cause firms to produce more and hire more workers when the aggregate price level rises. This is not an implausible theory and it certainly fits the longer-run facts of inflation and unemployment better than the pre-Phelps-Friedman inflation-unemployment tradeoff. The basic idea has been extended and used in many other applications.'

Because this theory had been laid out so explicitly, it has been possible to test the hypothesis and the predictions in many different ways, and indeed an enormous research effort has gone into performing such tests. Although the evidence seemed favorable at first, this effort has recently begun to uncover serious problems about the empirical validity of the informational-based Phillips curve, at least for the U.S. in much of the postwar period. Sargent (1976) found only weak explanatory power from unanticipated price movements, and Fair (1979) found that the effects were insignificant in the 1950s and 1960s, and of the wrong sign in the 1970s. Barro's (1977b) empirical work, which focused on unanticipated money rather than prices, seemed more consistent with the theory, but later work has shown the results to

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4. See Phillips (1958). Adaptive expectations might explain business cycle correlations, but some explanation is needed for why people would persistently adjust their expectations slowly when facing recurrent events. Adaptive expectations are a reasonable assumption following a new event, but to the extent business cycles are recurrent events this assumption needs further justification.

5. Sargent and Wallace (1975), Barro (1977a) for example. Interesting applications of these informational concepts to problems in monetary economics other than the Phillips curve include King (1982), Walsh (1982), and Weiss (1980).

be sensitive to variations in the assumptions. Most recently, for example, Mishkin (1982) has shown that anticipated money matters as much or more than unanticipated money. Perhaps, more bothersome is the empirical work by Barro and Hercowitz (1980) and Boschen and Grossman (1981) that misperceived money changes, as distinct from unanticipated money changes, do not stimulate production as the misperceptions model suggests they should. Another problem is the finding of Hercowitz (1980) that unanticipated money has little association with price dispersion as predicted by the information-based models.[6]

More recent attempts to demonstrate the validity of the new classical macroeconomics are Thomas Sargent's (1980, 1981) widely-publicized studies of historical examples of quick disinflation efforts in different countries. These examples are meant to show that instantaneous adjustment is at least possible. Sargent documents how the central European hyperinflations in the early 1920s ended very abruptly once budget reforms were put in place, and although recessions frequently accompanied or followed these disinflations they might be attributed to other sources. Garber (1982) has examined the recession following the German hyperinflation in detail, and considers whether it was directly due to the disinflation. One problem, of course, with hyperinflation examples is that most contractual or institutional rigidities break down during a hyperinflation (presumably to the detriment of microeconomic efficiency); hence there are no barriers to quick price and wage adjustment. Such examples do not seem relevant to more moderate inflations which have persisted for several years and where contractual rigidities have remained.

Recognizing this criticism Sargent has also examined the experience of France in 1926 when the Poincare government was elected with a broad mandate to institute budget reforms and stop the inflation which had persisted since World War I. Sargent shows that this more moderate inflation did stop abruptly after fiscal reforms were instituted, but does not examine the effects on the real economy.

In the upper panel of Figure 1 a plot of the wholesale price index in France during 1919-1927 is shown along with a measure of the money

6. Early worries that the theory did not explain the dynamics or persistence of the business cycle were cleared up theoretically by Blinder and Fischer (1981) and Lucas (1975), by adding other explicit sources of persistence, such as inventories or other types of capital. However, if the theory has trouble explaining the impulse effect, these propogation effects have nothing to propogate.

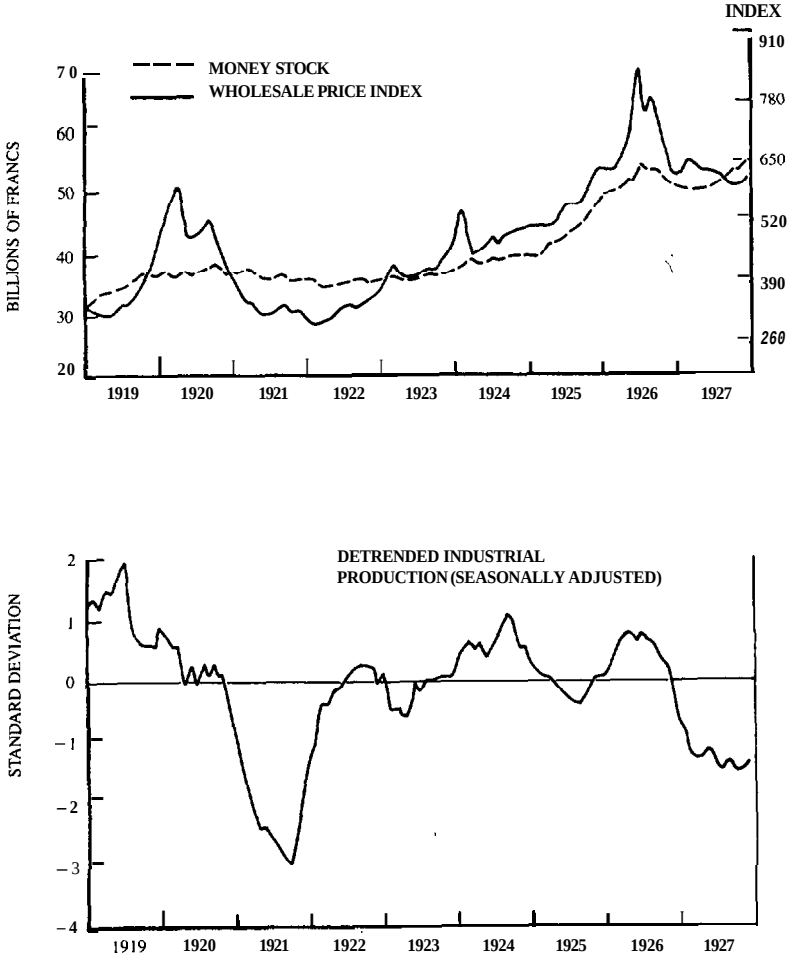

FIGURE 1. MONEY, PRICES, AND DETRENDED PRODUCTION IN FRANCE 1919-1927 (MONTHLY DATA)

SOURCE: ROGERS (1929) pp. 57, 176, 291

supply. In the bottom panel detrended industrial production is shown. It is clear from Figure 1 that a recession did accompany the disinflation which began in the summer of **1926** when the Poincare government came to power. Industrial production did not return to trend levels until more than two years after the disinflation began, after which it continued to rise for another year before the start of the great depression.

In fact the Sergent committee, which was set up in **1926** to recommend measures to end the French inflation, warned that such a recession would be likely. The experience with disinflation only six years earlier (again see Figure **1)** was probably enough to worry the committee. Ralph Hawtrey, a firm believer in endogenous expectations (see Hicks, 1969), wrote a paper in **1932** on the French disinflation which had the main purpose of showing that the French return to gold in **1926** was ultimately a major cause of the great depression. More important for our purposes was that he was puzzled that the disinflation did not lead to an even larger recession. His explanation was that nominal wages had lagged so far behind prices in **1925** and early **1926** that the real wage was very low throughout much of the period of disinflation. In addition he argued that much of the decline in aggregate demand which the monetary crunch generated was reflected in a decline in imports because the franc was pegged at a level that made foreign goods very expensive by historical purchasing power standards.

It seems clear that some evidence that the recession following the French disinflation was due to other causes is necessary before we can be confident that the market-clearing perfectly flexible wage model is adequate to describe that situation. This reconsideration of the facts seems to suggest that the French disinflation is more consistent with the contract-based expectations models than with the information-based models.[7]

The similarity between the flexible-price, market-clearing assump-

7. Nominal wages were stabilized in 1927, perhaps because the recession led to distress conditions which broke informal contracts or perhaps because depressed demand conditions led to a bidding down of nominal wages. The nominal wage index for hourly wages in Paris, in the provinces, and in the coal mining industry was as follows (Mitchell (1976)):

	Coal Mining	Paris	Provinces
1924	66	63	68
1925	69	68	73
1926	83	84	84
1927	92	84	86
1928	90	86	90
1929	100	100	100
1930	108	109	106

tions of the information-based models and the assumptions of the classical economists, such as Pigou, from whom Keynes and Keynesians are separated, has led to the term "new classicial macroeconomics" to refer to these models.[8] In fact a proliferation of names has arisen to describe these models in the many reviews in the literature? "monetarism mark II," "rational expectations with misperceptions," "the hard-line approach," and "the competitive market approach." All these terms are synonymous with the new classical macroeconomics, which features market-clearing, flexible-prices, and information-based explanations of the Phillip's curve.

B. A New Approach

At about the same time that the Lucas information-based theory was being tested and extended, a new approach to the same Phillip's curve policy issues was being developed by another group of researchers.[10] This new approach relied heavily on the techniques and ideas developed in the new classical research, and was motivated by the same aims: to improve quantitative policy evaluation in macroeconomics.[11] But rather than describing price movements using the market-clearing assumptions, these models contain explicit mechanisms to describe how prices (or wages) are determined. Recall that in the information-based models the working assumption is that there are no long-term contracts which set nominal wages or prices beyond a market-clearing period.[12] The new models are contract-based in that there is a finite period of time when a nominal wage or price is set and transactions are

8. Lucas and Sargent (1978).

9. See, in that same order: Tobin (1981), Okun (1980), Fellner (1980), and Diamond (1982).

10. See Gray (1976), Fischer (1977a), Phelps and Taylor (1977), Taylor (1979), for example. Some of the other research which is part of this new approach is described below. It should also be mentioned that this approach is being pursued in the open economy macroeconomic field. See Dornbusch (1982), for example.

11. The original motivation for this work was probably the striking policy ineffectiveness result of Sargent and Wallace (1975). However, even in the early contract-based papers other issues were raised about stabilization policy. Phelps and Taylor (1977) for example, noted that the monetary authorities might have to "penalize the economy in the short-run for the sake of beneficial system effects." This possibility which now seems very real could not have occurred in backward-looking Keynesian models.

12. Perhaps a quarter for the time period in the discrete models is appropriate. This seems to be the shortest time period used in the major empirical tests of the model (e.g., Barro and Rush (1980) and Sargent (1976)). If markets are assumed to clear within the quarter, then a fixed wage which lasts more than one quarter is simply ruled out by assumption.

assumed to take place at that price. There is no presumption that a formal contract is involved; nominal wages or prices could be set as part of an informal arrangement. These models give rise to a quite different mechansim for price and output fluctuations than those introduced by Lucas, and their properties and policy implications are much different. One difference which has attracted some attention is that anticipated and perceived changes in the money supply can affect output and employment. Tests of these models are not yet at the advanced stage of the tests of the information-based models. It is not yet clear that the contract-based models will need relatively minor revision, complete overhaul or replacement.[13]

In the terminology of this paper, these models are not "Keynesian" in that expectations are not exogenous or purely backward-looking. While there are of course expectational errors in these models, the expectations mechanism is endogenous and generally consistent with the economic events described by the models. But the most essential feature of these models is that the sticky prices are forward-looking; price and wage setting is anticipatory and expectations of future events matter for current wage and price decisions. This is not true either of fixed (for all time) prices, nor of exogenous but moving prices, nor even of the "tatonnement" prices which react to the current state of excess demand but are backward-looking. In the new kind of models, it is assumed that labor unions and corporations adjust their nominal wage bargaining to expectations about future wage, price, and demand conditions.

It may be helpful to think of this new forward-looking aspect of wage and price setting in terms of another type of decision which brings with it future commitments: capital investment. The economic aspects of a decision to set an hourly wage rate or a weekly salary are not unlike a decision to buy capital equipment. The useful life of business equipment is not much longer than the three-gear life of the typical labor union contract. A wage decision has implications for the firm's profits via the expectations of other wages, the prices of other inputs, the price of output, and the state of demand. Similarly, a

13. Tests by Ashenfelter and Card (1982) have found empirical difficulties with the distributed lag shape in the more rudimentary contract models. It is not yet clear whether such problems exist in more realistic contract models which reflect actual distributions of workers by different contract lengths. They also find inconsistencies with cross equation relationships which may be similar to those discussed by Barro and Rush (1980) for information-based models.

worker's expected return from working under a set nominal wage is affected by expectations of price and the wages of other workers. Moreover, if demand conditions are expected to be high during the contract period, the terms of the bargain might be tilted in the worker's direction.

The forward-looking aspects of wage and price decisions do not eliminate the problem of slow or gradual adjustment when conditions change. Because wage decisions have a finite duration, actions taken in the past have implications for today. Again the analogy with capital is helpful. Equipment purchased in the past affects the actual capital stock today and hence influences the demand for new equipment given a desired capital stock tomorrow. Hence, while decisions are made by looking at the future, there is an implicit but necessary element of backward-looking. The persistence generated by past wage decisions can be quite drawn out if wage contracting is nonsynchronized or staggered and wages are set taking expectations of other wages into account.

II. Reservations about the New View of Expectations

A number of criticisms of the contract-based expectations models have recently been raised. Before presenting empirical illustrations of how these models might be used in practice, some reaction to these criticisms is in order. We consider three criticisms here (1) price and especially wage decisions are not forward-looking, (2) contracts which set a fixed nominal wage and let demand determine employment at that wage are not optimal, and **(3)** contract length is endogenous and will adjust when the policy rule changes.

A. Forward-looking

Okun (1981) argued that wage contracts would not be forward-looking because "forecasting the wages of other firms is complex and costly," and because communicating the forecast to workers would be difficult.

The costs of gathering information to make forecasts raises questions about optimization in general. Firms need to forecast future demand for their products and because of long lead times in designing new facilities, being as accurate as possible in such forecasts has large payoffs. Why should it be more costly to forecast future wages than to forecast other variables? In fact, well developed wage surveys are now

available on a current basis to assist firms in this process. Many of these surveys provide information about wages over the next year or more. Communicating forecasts of future wages in competing industries, or future prices and demand conditions, may be difficult in the adverse surroundings of a collective bargaining negotiation. There is an obvious advantage to the firm to convince the workers that the prevailing wage'and price level will be lower during the contract period than the firm actually is forecasting. But for precisely this reason, most unions do not rely on the internal forecasts of firms. They either hire their own economic forecasters or insist that the negotiations be based on a consensus economic forecast coming from the major private forecasting firms.

Testing for forward-looking behavior is very difficult because any forecast of the future must be based on what is observable.[14] However, some criticism may be due to semantic confusion. Forward-looking in the contract-based models usually means only that future variables, like next year's prevailing wage, are important for the wage decision. This in itself seems unobjectionable: if the prevailing wage is expected to be $10 an hour then the wage settlement will obviously be less than if the prevailing wage is expected to be $20 per hour. However, the models also assume that the forward-looking is accomplished by rational forecasting. This does need further testing, and is likely to be more accurate during normal times with recurrent events than when the structure of the economy is changing quickly.

B. Inefficient Contracts

In an influential paper Barro (1977a) argued that the contract-based macro models rely on contracts which are inefficient. In Barro's words:

> The crucial element and the aspect that accurately marks this approach as "non-market-clearing" analysis — is the nonexecution of some perceived mutually advantageous trades (where trades may include side payments). In the context of voluntary exchange on spot markets, it would not generally be possible to exhaust all perceived mutually advantageous trades unless all prices were "flexible." However, long-term contracts [of the Azariadis (1975) variety] permit a separation between mutually

14. McNees (1979) performed tests which seemed to indicate that there was more backward-looking than forward-looking. On the other hand, recent work by Meyer and Webster (1982) indicates that forward-looking predominates.

advantageous exchange and short-run price flexibility — it becomes possible to retain the former while abandoning the latter.

Barro is correct in arguing that the early micro-theoretic work on implicit contracts implies efficient arrangements between firms and workers. More recent work based on moral hazard and asymetric information summarized by Hall (1980) has shown that these contracts can lead to inefficiencies, but these are not of the type that fixed nominal wage contracting generates for the economy as a whole. All the implicit contract research has been conducted in real terms (that is, explaining why the real wage is rigid) while most macroeconomic inefficiencies can be traced to sticky nominal wages.

As Fischer (1977b) noted in response to Barro, however, contracts in the real world resemble very closely the contracts assumed in the contract-based macro models. This response should not be taken lightly. At the least, it implies that rnicroeconometric work using contract data is feasible. It also suggests that a better way to model market adjustment might be through the use of such contracts, rather than through explicit market-clearing. Market-clearing models offer no explanation of how the market-clearing price is determined. Perhaps forward-looking wage and price setting rules are efficient ways for markets to "clear" when the economy-wide wage price vector cannot be called out. But this is an unsettled issue at this time.

There is a type of inefficiency which develops at the macro level when we consider that the economy adjusts through the interaction or many individual contracts between firms and workers. It is easiest to see this inefficiency by supposing that the contracts are designed to guarantee small movements in relative wages, rather than real wages. The optimal contracts call for reduced work when demand at the firm is low and more work when demand at the firm is high, as part of this relative wage guarantee. In the aggregate, such contracts generate a nominal wage rigidity.

Suppose there is a drop in the money supply. Real balances measured in terms of wages will fall, interest rates will rise, and there will be a slump in demand. According to each of the micro contracts, there will be a drop in employment. Eventually a series of relative wage adjustments will bring about a fall in the nominal wage and demand will rise again. This simple description is not unlike the mechanism which underlies the contract-based explanation of the positive correlation between nominal variables and real variables. The

details of the adjustment depend on the length of the contracts, how sensitive new negotiations are to demand conditions, and on the degree of forward-looking.

C. Endogenous Contract Length

Lucas and Sargent (1978) have raised doubts about the contract models because they assume that contract length would not adjust when economic conditions change. Similarly, indexing provisions in the contract might change. This criticism is also correct. But in most contract-based expectations models the assumption is made for convenience, and sensitivity analysis can be done to see how the results might be affected by changing the contract length. Recent work by Parkin (1982) based on earlier work by Mussa (1977) and others has carefully developed the micro-economic foundations of one of the contract-based models, and can relate contract length to adjustment cost parameters.[15] Empirical evidence, however, suggests that while contract length does vary over time, the changes are gradual and not obviously related to policy changes. Evidently, the costs of negotiation are still quite high relative to the gains for individual firms or union groups from more frequent negotiations.[16]

III. The Role of Expectations during Disinflation

Calculating the right speed of deceleration of the money supply — or one step removed, nominal GNP — during a planned disinflation, is a difficult but extremely important problem for monetary policymakers. Treating expectations correctly is clearly crucial for such a calculation. The new classical macroeconomic models suggest that the rate of disinflation can be quite rapid — with no harmful side-effects — if only

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15. Blanchard (1981) and Calvo (1982) have recently studied the microeconomic behavior of profit maximizing firms in a staggered price setting environment. Buiter and Jewitt (1980) have examined the effects of different combinations of real versus nominal anticipatory wage setting, obtaining results useful for sensitivity analysis. Begg (1982) has also examined the microeconomics of staggered nominal wage setting.

16. The length of U.S. major union contracts has not changed very much in recent years according to the data used in the model described in Taylor (1982). Christofides and Wilton (1982) have found evidence of contract length in Canada shortening in 1975 as the variance of inflation increased. This type of effect is predicted in the models of Canzoneri (1980) and Gray (1978) where contract length or indexing is endogenous.

the decline in money growth is made credible enough."[17] With no contracts or sticky prices, expectations of future inflation can be brought down instantaneously, and the economy-wide wage-price vector can be stopped abruptly according to these models. The Keynesian approach, as I have characterized it here and as it is embodied in most econometric models, cannot deal with the expectations question systematically, since the expectations mechanisms are backward-looking.

Preliminary quantitative models incorporating the theoretical ideas of the new approach to macroeconomic expectations described here can be used to address such questions. It will be helpful to illustrate this type of analysis with an example, and for this purpose I used a model of union wage contracting that I had recently studied (see Taylor (1982)). The model is oriented to detailed contract data of the major union sector of the U.S. and might be used to answer the following question: Assuming that expectations are rational, that the monetary deceleration program is credible, and that there are no anticipated relative wage adjustments necessary,[18] what is the maximum rate of deceleration of nominal wages which can occur without an increase in unemployment? The answer to this question can then be used to calculate the maximum rate of money growth reduction which can be obtained without a recession. The deceleration cannot be too fast because with long term contracts and deferred increases, there will be an overhang of predetermined nominal wages. Hence, a quick deceleration will result in a reduction in real money balances which will tighten credit markets, raise interest rates, lower demand, and increase unemployment. Gradualist proposals for moderate decelerations are sometimes based on such arguments. But quantitative estimates of what gradual reductions mean in terms of money growth statistics would certainly seem helpful.

The calculations described in Taylor (1982) are based on the assump-

17. If policy is not credible then the problem is much more difficult. Sargent (1981) has suggested that the recession which has accompanied the disinflation in the United Kingdom may be due to lack of credibility in that the public sector borrowing requirement was projected to be so large that inflationary money growth would return in the future. However, Miller (1980) has shown that the Thatcher government budget deficits were projected to decline over time if measured on an inflation adjusted basis. Meyer and Webster (1981) have attempted to approach the credibility problem systematically in models with perfect price flexibility using Bayesian or least squares learning. Cukierman (1981) has attempted to incorporate government announcements in measures of credibility.

18. Such as a reduction in the relative wage of automobile or steel workers.

tion that the ***major*** union sector dominates nominal wage movements in the U.S. economy. That assumption is certainly open to dispute since unionized workers constitute only about one-fifth of the labor force in the U.S. Implicit in these calculations is that the nominal wages of all other workers are simply indexed to the effective wage in the major union sector. The results reported here consider a modification of that assumption, by assuming that all other workers in the economy set their nominal wages for one year, and are fully integrated with the union sector. That is; unionized workers and their employers keep track of the wages of non-unionized workers, and visa versa. One would expect that, since the average contract length of the union sector is much larger than the one-year period we assume for the non-union sector, this modification would permit a faster deceleration.

Table 1 reports the results of the simulations. Starting from an inherited steady inflation of 10 percent, the simulations assume that an announced monetary disinflation begins in year 1 and that the new target inflation rate is **3** percent. The maximum rate of deceleration consistent with continued real growth of employment and output is shown in the table for four different assumptions. In the first column it is assumed that there is no indexing and that the major union sector leads. This cooresponds to the simulations reported in my earlier work. Clearly the rate of deceleration is quite slow for the first two years, when it begins to fall off rapidly. With 30 percent indexing of the two and three year contracts the deceleration is only a bit faster. The assumption on indexing — that there are only annual escalator adjustments with no adjustments in the first year — is perhaps more sluggish than in reality.

Alternative results are reported in the third and fourth columns of Table 1 where the rate of deceleration of wages is calculated for the entire labor force. As one would expect, here the deceleration is more pronounced in the first year, and wage growth comes down quite rapidly in the second and third years. Again with indexing, inflation comes down more quickly, but the differences are minor. The details of each settlement for workers signing contracts of different lengths is presented in Tables 2 through 5. These represent the kinds of union settlements one should expect during a rationally expected disinflation. Note that the deferred increases in the third year of the three year contracts are down significantly even during the early stages of the disinflation.

TABLE 1

Alternative Assumptions about Wage Contracts and Corresponding Disinflation Paths

(percent change in average wage at annual rate)

Year/ -Quarter	Major Union Sector (no indexing)	Major Union Sector (30% indexing)[2]	All Workers[1] (no indexing)	All workers' (30% indexing)'
1:1	10.00	10.00	9.91	9.89
1:2	10.00	10.00	9.74	9.70
1:3	9.98	9.98	9.48	9.41
1:4	9.96	9.96	9.08	8.96
2:1	9.93	9.92	8.65	8.49
2:2	9.81	9.79	8.13	7.93
2:3	9.48	9.44	7.52	7.30
2:4	9.13	9.07	6.85	6.62
3:1	8.77	8.71	6.03	5.82
3:2	7.52	7.46	5.18	5.01
3:3	5.32	5.27	4.36	4.24
3:4	3.97	3.94	3.63	3.57
4:1	3.64	3.62	3.24	3.22
4:2	3.15	3.15	3.02	3.02
4:3	2.93	2.93	2.96	2.97
4:4	3.02	3.02	3.01	3.01
5:1	3.00	3.00	3.00	3.00
5:2	3.00	3.00	3.00	3.00
5:3	3.00	3.00	3.00	3.00
5:4	3.00	3.00	3.00	3.00

Notes: [1]Assumes that all workers not in major union sector change wages annually.

[2]Assumes that the second year of all two-year contracts and the second and third year of all three-year contracts have escalator clauses equal to 30% of the previous year's inflation rate.

TABLE 2

Major Union Sector: Current and Deferred Settlements

***(No* indexing)**

Year/ Quarter	*1 Year Contracts*	*2 Year Contracts*		*3 Year Contracts*		
		1st Year	*2nd Year*	*1st Year*	*2nd Year*	*3rd Year*
1:1	10.0	10.0	9.6	10.0	9.6	6.4
1:2	10.0	10.0	9.3	10.0	9.3	5.1
1:3	9.9	9.9	8.7	9.9	8.7	4.0
1:4	9.8	9.8	7.7	9.8	7.7	3.4
2:1	9.6	9.6	6.4	9.6	6.4	3.2
2:2	9.3	9.3	5.1	9.3	5.1	3.0
2:3	8.7	8.6	4.0	8.6	4.0	3.0
2:4	7.7	7.5	3.4	7.5	3.4	3.0
3:1	6.4	6.4	3.2	6.0	3.2	3.0
3:2	5.1	5.1	3.0	4.4	3.0	3.0
3:3	4.0	4.0	3.0	2.7	3.0	3.0
3:4	3.4	3.4	3.0	.9	3.0	3.0
4:1	3.2	3.2	3.0	3.2	3.0	3.0
4:2	3.0	3.0	3.0	3.0	3.0	3.0
4:3	3.0	3.0	3.0	3.0	3.0	3.0
4:4	3.0	3.0	3.0	3.0	3.0	3.0

Note: The entries indicate the current settlement in the one year contracts, and in the first year of the two and three year contracts. The deferred settlements are listed in the second year of two year contracts, and in the second and third year of three year contracts. The rates of change are from one quarter to the next, reported in percent at an annual rate.

TABLE 3
Major Union Sector: Current and Deferred Settlements
(30% **indexing)**

Year/ Quarter	*1 Year Contracts*	*2 Year Contracts*		*3 Year Contracts*		
		1st Year	*2nd Year*	*1st Year*	*2nd Year*	*3rd Year*
1:1	10.0	10.0	6.6	10.0	6.6	3.6
1:2	10.0	10.0	6.3	10.0	6.3	2.5
1:3	9.9	9.9	5.7	9.9	5.7	1.8
1:4	9.8	9.8	4.8	9.8	4.8	1.8
2:1	9.6	9.5	3.6	9.5	3.6	2.0
2:2	9.3	9.2	2.5	9.2	2.5	1.9
2:3	8.7	8.6	1.8	8.6	1.8	2.0
2:4	7.6	7.4	1.8	7.4	1.8	2.1
3:1	6.3	6.3	2.0	5.9	2.0	2.1
3:2	5.1	5.1	2.0	4.3	1.9	2.1
3.3	4.0	4.0	2.0	2.6	2.0	2.1
3:4	3.4	3.4	2.1	1.0	2.1	2.1
4:1	3.2	3.2	2.1	3.2	2.1	2.1
4:2	3.0	3.0	2.1	3.0	2.1	2.1
4:3	3.0	3.0	2.1	3.0	2.1	2.1
4:4	3.0	3.0	2.1	3.0	2.1	2.1

Note: See Table 2

TABLE 4

All Workers: Current and Deferred Settlements

***(No* indexing)**

Year/Quarter	*1 Year Contracts*	*2 Year Contracts*		*3 Yepr Contracts*		
		1st Year	*2nd Year*	*1st Year*	*2nd Year*	*3rd Year*
1:1	9.6	9.6	7.8	9.6	7.8	4.8
1:2	9.2	9.2	7.1	9.2	7.1	4.1
1:3	8.7	8.7	6.4	8.7	6.4	3.6
1:4	8.1	8.1	5.6	8.1	5.6	3.2
2:1	7.8	7.3	4.8	7.3	4.8	3.1
2:2	7.1	6.3	4.1	6.3	4.1	3.0
2:3	6.4	5.1	3.6	5.1	3.6	3.0
2:4	5.6	3.7	3.2	3.7	3.2	3.0
3:1	4.8	4.8	3.1	2.1	3.1	3.0
3:2	4.1	4.1	3.0	0.4	3.0	3.0
3:3	3.6	3.6	3.0	−1.3	3.0	3.0
3:4	3.2	3.2	3.0	−3.1	3.0	3.0
4:1	3.1	3.1	3.0	3.1	3.0	3.0
4:2	3.0	3.0	3.0	3.0	3.0	3.0
4:3	3.0	3.0	3.0	3.0	3.0	3.0
4:4	3.0	3.0	3.0	3.0	3.0	3.0

Note: See Table 2

TABLE 5

All Workers: Current and Deferred Settlements

(30% **indexing)**

Year/Quarter	*1 Year Contracts*	*2 Year Contracts*		*3 Year Contracts*		
		1st Year	*2nd Year*	*1st Year*	*2nd Year*	*3rd Year*
1:1	10.0	10.0	6.6	10.0	6.6	3.6
1:2	10.0	10.0	6.3	10.0	6.3	2.5
1:3	9.9	9.9	5.7	9.9	5.7	1.8
1:4	9.8	9.8	4.8	9.8	4.8	1.8
2:1	9.6	9.5	3.6	9.5	3.6	2.0
2:2	9.3	9.2	2.5	9.2	2.5	1.9
2:3	8.7	8.6	1.8	8.6	1.8	2.0
2:4	7.6	7.4	1.8	7.4	1.8	2.1
3:1	6.3	6.3	2.0	5.9	2.0	2.1
3:2	5.1	5.1	2.0	4.3	1.9	2.1
3.3	4.0	4.0	2.0	2.6	2.0	2.1
3:4	3.4	3.4	2.1	1.0	2.1	2.1
4:1	3.2	3.2	2.1	3.2	2.1	2.1
4:2	3.0	3.0	2.1	3.0	2.1	2.1
4:3	3.0	3.0	2.1	3.0	2.1	2.1
4:4	3.0	3.0	2.1	3.0	2.1	2.1

. Note: See Table 2

TABLE 6

Recent Changes in Alternative Measures of Money Wages, 1980:1–1982:2

(Quarterly percent change at annual rates unless otherwise stated)

	Hourly Earnings	*Effective Wage Major Unions*		*Contract Wage in Major Union Settlements*			
				No Indexing		*With Indexing*	
Year/Quarter	*Index*	*Quarterly*	*Annual*	*1st Year*	*Life of Contract*	*1st Year*	*Life of Contract*
80:1	8.6	1.6		10.8	9.2	6.5	4.7
80:2	9.7	3.3	9.8	11.2	10.0	6.7	4.4
80:3	9.2	3.5	10.0	12.7	11.3	9.5	5.4
80:4	10.3	1.3	9.7	11.5	9.8	7.2	5.3
81:1	9.7	1.7	9.8	6.9	6.3	7.6	6.1
81:2	8.2	3.2	9.7	12.8	10.5	7.7	6.7
81:3	8.4	3.3	9.5	11.8	9.3	4.9	4.6
81:4	7.0	1.5	9.7	9.1	8.1	9.0	4.6
82:1	6.6	.9	8.9	7.9	7.5	.5	.3
82:2	6.2						

Source: Current Wage Developments, various issues. The annual effective wage change for the major unions is given by the average of the 4 quarters ending in the current quarter.

According to these results, if velocity is constant in terms of the nominal wage[19] then money growth should not be reduced any more quickly than the columns in Table 1. Taking the best case, with the non-union workers interacting with the union workers and with indexing, the rate of decline in money growth is gradual but it speeds up as the disinflation continues and then slows down again: 1 percent in the first year, 2½ percent in the second year, 3 percent in the third year, and ½ percent in the fourth year. Taking the least optimistic calculation, the decline is negligible in the first year, almost 1 percent in the second year, a whopping 5 percent in the third year, and 1 percent in the fourth year. In both cases the deceleration takes about four years.

Keeping with the same expectational assumption, these results indicate that a faster decline in wage growth than presented in these tables will cause a recession. It needs to be emphasized, however, that these expectational assumptions might be too optimistic. We suspect that rational expectations is a reasonable assumption for recurrent events, but for unique events it is more suspect. Moreover, the relatively small reduction in money growth at the start of the disinflation could raise credibility about future reductions in money growth and cast further doubt on the rational expectations assumption.

What do these calculations imply about the role of expectations compared with the new classical and Keynesian models? Relative to the new classical models, which under the same expectational assumptions suggest that wage inflation could drop from 10 percent to 3 percent in the first quarter, the results are quite different. This approach suggests that such a drop would cause a large recession. But relative to the backward-looking Keynesian models the results are different as well. These models suggest that steady full-employment, implicit in the simulation paths in Tables 1 through 5, would not reduce inflation at all. According to those models inflation would still be at 10 percent at the end of 5 years if there was no increase in unemployment.

It is helpful to compare the results of such simulations with money wage growth during the current disinflation. In Table 6 various measures of wage inflation are presented for the recent period. In all cases

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19. It would be an easy matter to incorporate a money demand function in the model and calculate the reduction in velocity which would accompany the reduction in expected inflation. This reduction in velocity would imply that money growth would have to be faster during part of the disinflation period than the growth rates reported in the Tables. If the real wage is steady then money balances could be deflated by the price level to get the same results.

the measures of inflation are rates of change from one quarterly average to the next, measured at annual rates as in the model simulations. Wage disinflation began in the first quarter of 1981 according to the average hourly earnings index adjusted for overtime and inter-industry shifts. Since then, wage inflation has fallen from near 10 percent to about 6¾ percent in 1½ years. Comparing this path with the columns in Table 1 indicates that this deceleration was faster than could be sustained while maintaining full employment, especially in the first year. Hence, according to this very preliminary comparison, the high unemployment rates we have experienced during this disinflation are consistent with this type of expectations model.[20] The extra reduction in wage inflation could be resulting either from unemployment-induced concessions (early negotiations) or attempts to bid down relative wages.

IV. The Role of Expectations and Accommodation of Inflation

The snapshot view of a disinflation in the simulations of the previous section leaves two important questions unanswered. First, how did we get to the double digit inflation rates at which these disinflation simulations start? Second, how do we prevent a return to higher inflation after the disinflation ends? The answer to these difficult questions must center around the old question of what causes the monetary authorities to increase the rate of growth of money and credit which makes episodes of inflation possible. Clearly this question has not been settled by economists, but the answer, at least for most modern developed economies where revenue from money creation represents a trivial portion of government tax receipts, must have to do with the accommodation or validation of inflation.

The new classical macroeconomists view the accommodation issue solely in terms of accommodating the ***expected*** rate of inflation. The clearest exposition is in Barro and Gordon (1981). The monetary authorities will suboptimally validate inflation according to this view because people expect them to. If they stop validating, then an unexpected and misperceived drop in money growth causes a drop in production because suppliers are misperceived into thinking only their

20. The effect of the automobile and trucking concessions is seen clearly in the last entry of the second column of Table 6. No wage adjustment occurred for the 460,000 workers covered by the auto and trucking contracts, and these workers moved from the third to the first quarter for the average computed in Table 6. They represent 70 percent of the workers negotiating during the first quarter.

own wages and prices have fallen relative to expectations. A recession then develops. As these models indicate, a socially preferred solution would be for policymakers not to accommodate at all. However, this view is dependent on the misperceptions mechanism being an accurate model. The research discussed in Section I sheds doubt on this for the United States.

The Keynesian view of accommodation is that if the monetary authorities do not validate exogenous increases in prices — such as OPEC, large wage bargains, or agricultural shocks — then a recession will develop. As reviewed in the mid-1950s by Haberler:

> If monetary policy does stand firm [is not accommodative], wages (or some wages) will be pushed up anyway. As a consequence unemployment will appear and the monetary authorities are then confronted with the dilemma either to "create" a certain amount of unemployment or to tolerate at least from time to time a rise in the price level.

Events in the 1970s might indicate that the last sentence should finish with "inflation rate" rather than "price level." In any case, the Keynesian models are still giving the same answers to these questions. Although the Phillips curve has been augmented, the expectations effect of an accommodative policy on wage and price behavior, once it becomes expected, has been ignored.

Some of the contract-based rational expectations models have been designed especially to address this accommodation issue. In these models the issue is not only whether expectations should be validated as in the new classical models but also whether the existing contracted trend in wages and prices should be validated. Because both factors must be considered, the answer is more complex than with either of the other two views of expectations. It should be noted, however, that the rational expectations assumption is probably more accurate for such issues than for the question of a one-time disinflation, because many price and wage shocks are recurrent phenomena.

Because these models have both the inertia of sticky prices and expectations, one might expect that a compromise amount of accommodation would be implied — less accommodation than the Keynesian models but more than the new classicals. The issue here is a quantitative one. Research with some empirical models with contracts and rational expectations suggests that the answer might be a lot closer to

the new classical than to the Keynesians.[21] Clearly more empirical work can and should be done.

V. Concluding Remarks

In this discussion of the role of expectations for monetary policy, I have emphasized what I feel are serious empirical problems with both the new classical and Keynesian macroeconomics, and I have tried to describe the general features of a new approach which I feel can provide an improvement. The new approach combines elements of both views, but as evidenced by serious criticism of the approach from proponents of these views, it is not a compromise view let alone a synthesis of these views.

The quantitative policy implications of the new approach which I outlined — that a very gradual and expected monetary deceleration could reduce inflation without disrupting real growth, that such a gradual deceleration raises serious credibility problems in its early phases, that a sudden disinflation would cause a big recession, even if expected, and that less accommodation of inflation in the future is a move in the right direction — are meant to be examples of how the approach can be applied to policy problems. Other researchers using these methods have drawn and will continue to draw their own conclusions. But in emphasizing differences between this new approach, and that of the new classicals and the Keynesians it is impossible to hide the similarities. In particular, the new approach owes much to the innovative empirical and theoretical methodology introduced by the new classical macroeconomics. As Tobin (1981) has recently written, "The ideas of the [new classical macroeconomics] are too distinctive and powerful to be lost in the shuffle. They are bound to shape whatever orthodoxy emerges."

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21. According to calculations with the empirical models in Taylor (1979) and Taylor (1980), less accommodative policies than we have experienced in recent years would appear to be desirable. Blinder (1981) has made similar theoretical calculations using the Fischer (1977a) model. His results generally depend on the values of the parameters of the Fischer model. It is worth stating here that while the new models' answer to the accommodation issue seems close to the new classicals, the new models also imply that stabilization policy is effective on real variables which is quite unlike the new classicals. See Taylor (1981) for further discussion on this point.

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