**Beyond the Natural Rate: Stephen Marglin**

**on the Instability of Market Economies**

Michael Woodford

Columbia University

Stephen Marglin’s *Raising Keynes: A Twenty-First Century General Theory* is a landmark achievement. Marglin offers a restatement and reformulation of the central message of Keynes’ *General Theory*, in the light of both subsequent discussions and subsequent economic developments. He seeks to clarify how he believes that Keynes’ argument should be understood, defending it not only from decades of criticism by Keynes’ detractors, but also from what he regards as decades of mischaracterization by the exponents of Keynesian macroeconomics.

This might seem well-traveled ground, and perhaps of purely antiquarian interest at this stage in the development of macroeconomic thought. But the first two decades of the current century have amply demonstrated the continuing centrality of the issues with which Keynes was concerned in the *General Theory;* and the associated public and professional debates have shown that there is far from a settled consensus about even the most fundamental questions about the economics of severe depressions. Marglin’s review of the issues could therefore not be more timely. And he goes well beyond a simple rehearsal of familiar arguments, carefully developing a more technically sophisticated and internally coherent analysis than the one that Keynes managed to present in the 1930s.

One of Marglin’s central contentions is that conventional pedagogy has presented a misleading view of Keynes’ ideas, by seeking to explain the nature of a Keynesian unemployment equilibrium using a static system of equilibrium relations, as in the mathematical formulations of Keynes’ message proposed by John Hicks and Franco Modigliani soon after the publication of the *General Theory*. While these simple formulations had their value --- and surely helped to disseminate Keynesian ideas to a broader audience of economists --- describing the Keynesian equilibrium in terms of a static system of simultaneous equations required that one or more of these equations specify wages or prices (or both) as completely rigid, fixed at a level that is no longer appropriate to current conditions. This has allowed many readers to suppose that a Keynesian slump --- if it can occur at all --- must surely be a very transitory situation, one that should be eliminated as soon as wages and prices are adjusted in response to evident market imbalances.

Marglin instead argues, as Keynes also contended, that the kind of slump that is diagnosed in the *General Theory* is one that could in principle persist indefinitely, in the absence of any policy intervention or change in the structural conditions that give rise to the crisis. That is, there are no “market forces” that automatically eliminate the kind of aggregate demand shortfall observed during the trough of the Great Depression. But to show this, one needs to consider, not a static equilibrium in which wages or prices are assumed by fiat to be rigid, but rather a dynamic process in which wages and prices *do* adjust --- in order to show why such adjustment does not solve the problem.

This requires a form of dynamic modeling that goes well beyond the relatively informal theorizing in Keynes’ book, and Marglin’s criticisms of the continuing role of crude static formulations of Keynesian economics, at least in undergraduate teaching, have considerable merit. As I explain further below, some of his complaints about the neglect of properly Keynesian insights in the current research literature are less justified. The “New Keynesian” literature of recent decades has explored Keynesian themes using fully dynamic models of wage and price adjustment, and I shall argue that this literature includes discussions of the possibility of a sustained slump that are closely related to the analysis that Marglin proposes.

Nonetheless, Marglin succeeds at bringing into sharp focus issues that have not been so clearly addressed in the New Keynesian literature. The New Keynesian literature has made a great deal of the idea that aggregate demand matters --- this is the key departure of the NK literature from the previously dominant style of equilibrium macroeconomic modeling, and the sense in which it is considered to be “Keynesian.” But does aggregate demand matter only in the short run, with supply considerations alone determining the level and pattern of economic activity except in that (possibly quite transitory) short run? This is the issue on which Marglin focuses his analysis, and where he has much to say that is important --- not only for understanding intellectual debates of the past, but for clarifying foundational issues in macroeconomics for the twenty-first century.

**1. Macroeconomic Equilibrium when Prices Take Time to Adjust**

The central insight of Marglin’s reformulation of the *General Theory* can be explicated using the diagram in Figure 1 below. Let us consider how aggregate employment, output and real wages are determined in a short-run equilibrium, taking as given the capital stock and the existing production technology. The *labor-supply schedule* (labeled LS in the figure) indicates the aggregate output *Y* that can be produced, given the amount of labor that households are willing to supply if the real wage is *W/P*. (Here households are assumed to optimize taking wages and prices as given, as in a model of competitive equilibrium.) The *goods-supply schedule* (labeled GS in the figure) instead indicates the aggregate output that competitive firms would be willing to supply, again in the case of a real wage *W/P.* Thus one schedule indicates a relationship between aggregate output and the real wage that should exist in a competitive equilibrium as a result of optimizing behavior on the part of households, while the other indicates a relationship between the same two variables that should exist as a result of optimizing behavior on the part of firms. I have drawn the schedules with *P/W* on the vertical axis (rather than the real wage *W/P*, that might seem more natural in a discussion of labor-equilibrium) in order to follow Marglin’s exposition.



In a general competitive equilibrium --- where it is assumed not only that both wages and prices are perfectly flexible, but that some “Walrasian auctioneer” sets both wages and prices at each point in time so that markets clear --- then both output and the real wage must simultaneously be consistent with both of these relations. Hence both *Y* and *W/P* must given by the coordinates of point E in the diagram, the unique point of intersection between the LS and GS schedules. Equilibrium output is determined, in such a model, by production possibilities on the one hand (reflected in the GS schedule) and household intratemporal preferences (attitudes toward the consumption-leisure tradeoff, reflected in the LS schedule) on the other. Nominal quantities (the absolute level of either wages or prices in currency units) are irrelevant to the determination of real activity in such an account, as are interest rates, expectations about the future, or other intertemporal factors. There is no role for anything that one can think of as “aggregate demand” in output determination; aggregate output is determined entirely by optimizing supply decisions.

Of course, equilibrium also requires that everything produced be willingly purchased, and one can add to the diagram a curve indicating the conditions under which this should be true, as Marglin does. The *aggregate demand schedule* (the vertical line AD in the figure) indicates the amount of produced goods that the private sector wishes to purchase at the current moment, given the real interest rate (i.e., the relative price of goods now as opposed to in the future) and the configuration of asset prices more generally, and expectations about future conditions (future income prospects, for example, that affect the desirability of saving). More precisely, the AD line indicates the value of *Y* such that if aggregate current income is *Y*, people want to purchase exactly *Y* in aggregate. This schedule need not be perfectly vertical (the value of *Y* with this property might depend on the level of real wages); but it’s reasonable to suppose that it should be steeper than either of the other two curves, which is what matters for the current discussion.

Once we add a third schedule, the system appears to be “over-determined,” in Marglin’s terminology; there are three relationships between the two variables *W/P* and *Y,* that all must hold in order for there to be a competitive equilibrium. Should they not generally be inconsistent, as in the case shown in Figure 1? In the Walrasian equilibrium view of the world, the answer is no. The location of the AD schedule depends on the real interest rate, and in the Walrasian view, the equilibrium real interest rate is precisely the one that causes the AD schedule to pass through point E. (In the classical formulation used by Keynes’ contemporaries, the equilibrium real interest rate is the one that causes aggregate saving to equal aggregate investment; this is equivalent to saying that aggregate demand is equal to aggregate income, and hence to the aggregate value of produced goods.) Thus even when the desired intertemporal allocation of spending is taken into account, equilibrium output at each point in time should be completely supply-determined.

Under such a view, deviations of output from a constant (or steady trend) level are possible, if for example there is an exogenous disturbance to production possibilities (the “technology shock” hypothesis emphasized by real business cycle theory). But if output and employment were to be temporarily low for such a reason, this could not be viewed as a failure of the market mechanism. Indeed, it can be shown that the equilibrium allocation of resources would still be the one that maximizes the welfare of the economy’s representative household, given production possibilities.

Marglin’s objection to this model of macroeconomic equilibrium is based on the fact that there is in reality no “Walrasian auctioneer” who arranges for wages and prices (and asset prices, including interest rates) to be the ones that will simultaneously cause all markets to clear. Conventional undergraduate pedagogy says that in the Keynesian view, wages and/or prices are rigid at some level that need not clear one or more markets, and that this is why the Walrasian equilibrium need not be reached. Marglin instead assumes that none of these prices are actually rigid. But he points out that they cannot be expected to be at the right levels to clear markets by magic; they must get there (if they get there) as a result of some process of adjustment to perceived market imbalances. And instead of simply assuming that they must (eventually, if not immediately) reach the Walrasian equilibrium prices, simply because there is no other case in which there would not be market imbalances of one sort or another, he argues that one must model the process of adjustment, and ask whether it eventually leads to point E or not.

For a simple illustration of how a different kind of equilibrium is possible, it is useful to consider the case in which wages are perfectly flexible (or, in Marglin’s terms, adjust very rapidly in response to any imbalance between existing wages and the ones consistent with the LS schedule). This is not the only case discussed by Marglin (or even his preferred case), but it is a limiting case of his more general argument. It is useful to consider this case here for two reasons. First, it provides a direct demonstration of a point of interest to Marglin (as it was to Keynes), which is that the possibility of a sustained slump would not be eliminated by increasing the downward flexibility of wages. And second, it will make the parallel between Marglin’s argument and the New Keynesian analysis especially evident, since simple expositions of the New Keynesian model often assume an instantaneously clearing labor market (though this is in no way a general presupposition of New Keynesian modeling, either).

Suppose that the economy starts out in an equilibrium where all markets clear, meaning that interest rates are such that the AD schedule passes through point E (the point of intersection of the other two schedules), and real wages are at the level indicated by point E as well. But suppose that some sort of disturbance to aggregate demand occurs, so that the AD schedule shifts to the left (to some level of aggregate demand that is less than , the competitive equilibrium level of output, as shown in Figure 1). For example, uncertainty about the future may increase, increasing desired precautionary saving at the currently prevailing real rate of interest. In the classical view, the real interest rate must immediately fall, so that AD continues to pass through point E; the hypothesis of a shift in the schedule is inconsistent with the theory of interest-rate determination. In the Keynesian view (and Marglin’s), however, the interest rate need not fall, or need not fall enough, as we discuss further below; and the AD schedule may shift to the left.

What happens in this case? Marglin’s general analysis allows for inventory dynamics, in which the quantity produced need not fall immediately, and is only reduced in response to the accumulation of excess inventories owing to production in excess of current demand. Here I shall simplify the discussion by assuming that the quantity produced must immediately fall to the level of aggregate demand; for example, we may imagine an economy in which producers stand ready to fill whatever orders they receive, but do not produce except when there is a customer to serve. Hence output *Y* must fall immediately to , or more generally, the economy must move to a point on the new AD schedule.

If we assume that neither wages nor prices change, this would mean movement to the point on the AD schedule directly to the left of point E. But this would be a point below the LS schedule, meaning that people wish to supply more labor (at the existing real wage) than firms need in order to produce the quantity . Wages should fall, and under the hypothesis that they are flexible enough to clear the labor market at all times, they must fall to the point where *P/W* is at the level indicated by point S.

Point S (for “Slump”) represents a situation with Keynesian unemployment, the equilibrium of a static model in which prices are assumed to be completely rigid. This point is far to the left of the GS schedule, meaning that firms would wish to produce more, if they could sell as much as they liked given current prices and wages. A natural question about such a static analysis is, why shouldn’t prices be negotiated downward, if firms would be willing to sell more, even at a price somewhat less than P? Marglin’s answer is that indeed they should be; but that the process of adjustment of prices takes time. He posits a differential equation for the price level of the form

 (1)

where  is the level of output indicated by the GS schedule, and θ is a positive constant indicating the speed of price adjustment in response to an imbalance between the quantity that firms would wish to sell at current prices and the amount they actually sell.

This implies that if the AD schedule shifts to the left, as shown in Figure 1, prices should immediately begin to fall, at a rate proportional to the horizontal distance of point S from the GS schedule. One might think that this should tend to eliminate the discrepancy between firms’ actual level of production and the quantity that they would wish to supply, so that the economy ends up at a point on the GS schedule, before too long. But Marglin notes that this is not the case. Under our assumption that wages are perfectly flexible (or more precisely, that they adjust more rapidly than prices), any decline in *P* should lead *W* to fall as well, so that the decline in prices does not cause the economy’s point of operation to fall below the LS schedule. This means that wages must fall at exactly the same rate as prices, leaving *P/W* unchanged. But since *P/W* does not change, the gap between  and *Y* is not reduced. The economy remains at point S, and equation (1) continues to imply a constant rate of decrease of both prices and wages.

Thus in Marglin’s analysis, point S is the new equilibrium of the economy, given the decline in aggregate demand. It is an “equilibrium” not in the sense that markets clear --- they do not, given that the economy is not on the GS schedule --- but in the sense that the state of affairs represented by point S can persist indefinitely, with no tendency of any automatic adjustment processes to move the economy away from it. The analysis vindicates Keynes’ contention that a slump with unemployed resources can persist permanently, in the absence of government intervention (or some other exogenous change in economic conditions). But it doesn’t depend on any assumption that either prices or wages are simply rigid, and will never be reconsidered despite their continuing inappropriateness; instead, the slump equilibrium is one in which both prices and wages are constantly falling in response to competitive pressure. Nor is the problem one that can be cured by making wages or prices “more flexible”: wages are already assumed to be perfectly flexible in the above analysis, and making prices more flexible (by arranging for θ to larger) would increase the rate of deflation of both wages and prices, but without moving the equilibrium away from point S.

**2. Is the Demand for Money the Source of Economic Slumps?**

The key insight of Keynes’ *General Theory* is sometimes said to have been the recognition that actual economies are monetary economies rather than barter economies --- that is, that goods and services are sold for money rather than directly exchanged for other goods and services. This is argued to be the key to understanding how a situation of persistently insufficient aggregate demand is possible. In a (hypothetical) barter economy, it is argued, an offer to supply goods or services would have to be simultaneously an offer to buy other goods and services of equal value from someone else, so that there would be no possibility of an overall shortfall of demand relative to supply.

An influential formulation of this idea during the heyday of general equilibrium theory was due to [Don Patinkin](https://mitpress.mit.edu/books/money-interest-and-prices-2nd-edition-abridged). The key puzzle, for Patinkin, was how an insufficiency of aggregate demand could be consistent with Walras’ Law: the proposition that optimizing supplies and demands should satisfy the property that the total excess of supply over demand equals exactly zero, when the supplies and demands for different goods are aggregated using market prices. This property should hold regardless of the prices that economic units take as given in choosing the amounts that they wish to supply or demand; hence an assumption that wages or prices are rigid for some reason at levels that do not clear markets is not a reason for an exception to Walras’ Law. Patinkin’s solution was to argue that in a monetary economy, money balances had to be included as one of the “goods” demanded by economic units; the Keynesian scenario of a slump due to a shortfall of aggregate demand was then imagined to involve demand less than supply in the case of *goods other than money*, but an excess demand for money.

Under this view, one might suppose that study of the sources of the demand for money balances would be a crucial issue for macroeconomic theory. One might also imagine that innovations in the payment system that affect the supply of and demand for money-like assets should have fundamental consequences for the overall level of business activity. But one of the virtues of Marglin’s careful reconstruction of the argument of the *General Theory* is to make it clear that this such factors are not really the critical ones. Note that the summary above of the basic logic of a Keynesian slump makes no reference at all to any demand for money balances

--- or even to monetary policy, except insofar as assumptions about monetary policy are implicit in the assumption that the AD schedule can remain to left of point E for a sustained period of time. (More on what is assumed about monetary policy below.)

The reason that Walras’ Law does not hold in a situation like the one depicted by point S in Figure 1 is unrelated to any demand for money balances. If one says that there is an “excess supply of goods” in this situation, treating firms’ “desired supply” of goods given existing prices and wages as the quantity  indicated by the GS schedule, then one should correspondingly say that these same firms’ “desired demand” for labor is the amount that they would have to hire in order to produce the quantity . This is more than the amount of labor that firms actually hire, in the equilibrium depicted by point S. And it is more than the amount of labor that households wish to supply, given existing prices and wages, since  is to the right of the LS schedule (for the *P/W* ratio associated with point S). Thus point S is a situation in which there is an excess supply of goods, but a corresponding “excess demand” for labor, so that Walras’ Law is satisfied. (Of course, this “excess demand” for labor exists only in terms of the Walrasian excess demand functions of wage- and price-taking economic units. Firms don’t actually express any such demand for labor in the slump equilibrium: they hire only the amount needed to produce the quantity *Y* associated with point S. Hence there is no upward pressure on wages.)

The only sense in which it is important to the Keynesian analysis that actual economies use money is a different one: what is important is the role of money as a *unit of account,* rather than as a potential store of value. It is indeed crucial to the discussion above that wages and prices are quoted in monetary units. This means that when wages and/or prices are perceived to be out of line with current market conditions, they are adjusted *in monetary terms.* This in turn makes possible a continuing slump of the kind represented by point S in Figure 1, in which both wages and prices are constantly falling in monetary terms (in response to the insufficiency of demand), but relative prices (such as the real wage) do not change.

**3. Comparison with the New Keynesian Analysis of Sustained Slumps**

The reconstruction of the Keynesian theory of slumps sketched above makes a number of very valuable points, and Marglin deserves praise for making them so lucidly. However, it isn’t really right to suggest, to the extent that Marglin sometimes does, that the possibility of a Keynesian slump is neglected or denied by mainstream macroeconomics.

It’s true that the analytical formulation of Keynesian economics in the decades immediately following the *General Theory,* by authors such as Hicks and Modigliani, was in terms of a static system of equilibrium relations, so that an equilibrium with unemployment could occur only insofar as one assumed that wages or prices (or both) were rigid over the period of time to which the model equations were intended to apply. But “New Keynesian” macroeconomic models (that began to be discussed in the late 1970s, and had developed into a complete dynamic general-equilibrium analysis by the late 1990s) instead describe how wages and prices are endogenously determined by market conditions, and give considerable attention to the dynamics of how they change over time in response to changes in underlying conditions. This newer literature not only does what Marglin calls for --- that is, it explicitly models the processes by which wages and prices adjust, rather than simply assuming that wages and prices must be the ones required for a Walrasian equilibrium --- but it shows how a persistent slump can occur in the absence of a suitable policy response. And in fact, the way a slump equilibrium works in the NK models is quite similar to Marglin’s analysis.

The main difference is that the NK models go a good deal further than Marglin’s proposed approach in specifying exactly who sets wages and prices, what objective they seek to maximize by setting them in the way that they do, what constraints they are under, and what they believe about the consequences that would follow from behaving differently. Marglin’s analysis posits dynamics for wages and prices that involve only the same schedules, summarizing aggregate behavior, that would be used to define a competitive equilibrium. When one writes an equation like (1), it isn’t entirely clear who exactly is changing prices at the rate described by the equation, what determines how quickly or slowly they should change, or even what mechanism ensures that all firms sell at a single price (in a situation where individual firms would seem to have an incentive to undercut “the market price”). NK models instead spell out more completely who is doing what and what their motives are. The models may or may not seem entirely realistic --- a disadvantage of more completely specified models is that it is easier to see the ways in which they make assumptions that certainly aren’t true of all consumers, all markets, and all firms, while an analysis like Marglin’s may seem more realistic simply because its assumptions are mainly left implicit. But an advantage of the modern, “micro-founded” style of analysis is that it allows one to ask harder questions about the internal coherence of the analysis --- and in the case of the longstanding debates about Keynes’s conception of an unemployment equilibrium, the question of internal coherence has indeed been the focus of much of the discussion.

One of the most common models of price adjustment in the NK literature assumes an economy made up of firms that are each the unique supplier of the good that it produces, though no one of these goods accounts for more than a negligible fraction of consumers’ budgets. Because the differentiated goods are not perfect substitutes, each firm has the power to set the price at which it is willing to sell its good, and an equilibrium is possible with positive sales of all goods even when firms do not charge identical prices. This makes it possible to analyze the price-setting decisions of individual firms, and then to model the adjustment of the overall level of prices by aggregating the decisions of the large number of individual firms that make up the economy.

In a common model of gradual price adjustment [introduced by Guillermo Calvo](https://www.sciencedirect.com/science/article/pii/0304393283900600), firms only reconsider their prices at random intervals, and leave their prices unchanged otherwise. The probability that any given firm will reconsider its price is identical over any short time interval, so that in any week the fraction of the firms that reconsider their prices is the same. In a model of this kind, the rate of increase of the price index *P* is given by

, (2)

where *P\** is the price that it is optimal for a firm to set under current market conditions, *P* is the index of existing prices, and *f* is an increasing function with the property that *f*(1) = 0. Thus the general level of prices increases if and only if the firms that reconsider their prices choose a price *P\** that is greater than the general level of existing prices. Here the shape of the function *f* depends on how frequently firms reconsider their prices on average, and also on the way in which individual prices are aggregated in the index *P.*

The price *P\** is the one that would maximize the firm’s profits. Let a firm’s instantaneous real profits be given by a function Π(*P*/*P*, *P/W, Y*), where *P*is the price charged by the individual firm. Then if a firm chooses myopically (i.e., chooses the price that would be optimal for market conditions at the time that the price is chosen), the optimal price *P\** is implicitly defined by the first-order condition

Π1(*P*\*/*P*, *P/W, Y*) = 0. (3)

If we solve equation (3) for the myopically optimal relative price *P\*/P* as a function of *P/W* and *Y,* and substitute this into (2), we obtain the predicted rate of growth of the price index as a function of *P/W* and *Y.*

The resulting theory of price adjustment is quite closely related to the Hicksian “fixprice dynamics” specified by equation (1). We can define a goods supply schedule analogous to the GS curve in Figure 1, but for the case of monopolistically competitive firms, by graphing the function  that is implicitly defined by the equation

Π1(1, *P/W, Y*s) = 0.

(This defines the relationship that must exist between *P/W* and *Y* in order for no firm to wish to charge a price different from the existing level of prices.) The resulting goods supply schedule is not exactly the same as the Marshallian supply curve assumed in Marglin’s discussion; in particular, the fact that monopolistically competitive firms have some market power leads them to wish to set their prices above their marginal cost of supplying goods, which makes  lower than it would be for perfectly competitive firms. But the curve is upward-sloping in the way assumed by Marglin, and the way in which it depends on the production technology is essentially the same as in the competitive model. (The most important consequence of introducing monopolistic competition is that point E no longer represents an efficient allocation of resources, even if it can be reached.)

If we log-linearize equation (3) around a point on the GS schedule (that is, values of *P/W* and *Y* that represent a possible stationary equilibrium with stable prices), then the solution can be written in the form

log (*P\*/P*) = α [log *Y* – log ] , (4)

where α is a positive coefficient. If we similarly log-linearize (2), we obtain a solution for  as a negative multiple of [log  - log *Y*]. This is the same kind of relationship as is postulated in (1), if we replace the arithmetic gap between  and *Y* by the logarithmic (or percentage) gap. Importantly, we still conclude (as Marglin does) that prices should fall if and only if *Y* falls below , which is to say, the economy operates at a point above and to the left of the GS schedule. We further conclude that there should be a constant rate of deflation as long as the economy remains at the same values for *P/W* and *Y* (for example, at the values corresponding to point S in Figure 1).

The model of price adjustment typically used in New Keynesian models involves a further complication, however, which increases the difference from Marglin’s fixprice dynamics. The simple calculation sketched above assumes that a firm that reconsiders its price chooses a new price that maximizes its instantaneous profits given market conditions at that moment. But since a random time interval will elapse before the firm reconsiders its price again, the firm should also consider how the profits associated with the choice of a price *Pf*will change as wages and other prices change over that time interval. If wages and prices are both expected to grow at some steady rate π over the indefinite future, the relative price *P\*/P* that will maximize the expected discounted sum of profits over the time that the new price remains in effect is given (in the same kind of log-linear approximation as above) by an expression of the form

log (*P\*/P*) = α [log *Y* – log ] + ϒ π, (5)

where now ϒ is another positive coefficient. (If wages and other prices are expected to fall over the time that firm *f’*s price remains unchanged, this is a reason for firm *f* to set its price *Pf*at a lower level relative to the general level of prices *P* at the time of the decision.)

If one uses (5) rather than (4) to substitute for *P\*/P* in equation (2), one obtains a solution for the rate of price increase that is an increasing function of the *expected* rate of price increase π. Moreover, each one percent increase in π increases  by less than one percent. It follows that for any values of *P/W* and *Y,* one can solve for the rate of inflation or deflation π with the property that if prices and wages are expected to increase at the rate π indefinitely, the general level of prices will increase at exactly the rate π. This represents the “perfect foresight” rate of inflation if *P/W* and *Y* are expected to be maintained at fixed values forever.

But even with this more complex account of inflation determination, it remains the case that if a combination of structural factors and the policy regime result in real aggregate demand remaining fixed indefinitely at the level , the NK model (in the case of an instantaneously clearing labor market) implies that aggregate output and the real wage should remain indefinitely at the values corresponding to point S in Figure 1, just as in Marglin’s analysis. The more complex model of price-setting simply changes the model’s prediction about the rate of wage and price deflation in this equilibrium. If firms correctly anticipate the rate of deflation, and take this into account in an optimal way in setting their prices, this increases the predicted rate of deflation associated with such an equilibrium. But it is still true that point S represents an equilibrium that should persist indefinitely, in the absence of either a change in the structure of the economy or a change in policy.

The New Keynesian literature models the possibility of a persistent slump in essentially this way. A simple example that has figured prominently in discussions of monetary and fiscal responses to persistent under-utilization of resources considers a scenario under which the economy’s underlying fundamentals evolve according to a two-state Markov chain, in which one state (the “crisis state”) involves an AD schedule passing through point S, while the other state (the “normal state”) involves an AD schedule passing through point E. (See for example section 2.2 of [this review paper](https://drive.google.com/file/d/1vKfVvF9RwsMiMoqdEdO-wfbrdLbuM345/view).)

The model assumes that a situation arises (due, for example, to losses in the financial sector) that shifts the AD schedule to the left; the economy’s underlying fundamentals remain in the distorted state until they return (for reasons treated as exogenous) at some random date to the normal state, where they then remain. As a consequence, the economy operates with the output and real wage indicated by point S in Figure 1 for as long as the crisis state persists, with both wages and prices falling at a constant rate; as soon as fundamentals return to normal, output and the real wage jump to those shown by point E, and both wages and prices remain stable from then on. The model was first introduced by Gauti Eggertsson and myself, to consider policy options for Japan during the deflationary slump in which the country found itself following the collapse of the bubble economy of the 1980s. It has also been used by Eggertsson and others to model [the US economy during the Great Depression](https://www.aeaweb.org/articles?id=10.1257/aer.98.4.1476) and [the effects of New Deal policies](https://www.aeaweb.org/articles?id=10.1257/aer.102.1.524), and to consider the multiplier effects of government spending in a situation like the one resulting from the financial crisis of 2008-09 (for example, [here](https://www.journals.uchicago.edu/doi/full/10.1086/657529), [here](https://www.journals.uchicago.edu/doi/10.1086/659312), and [here](https://www.aeaweb.org/articles?id=10.1257/mac.3.1.1)).

These discussions have typically assumed that the economy does eventually reach the equilibrium shown by point E (the level of activity and the real wage that would be associated with perfectly flexible wages and prices) in finite time with probability one. However, it should be emphasized that the crisis ends, in these models, for purely exogenous reasons; there is no tendency for the severity of the slump to be ameliorated over time through automatic “market forces,” and the crisis state can last arbitrarily long with no change in the degree of under-utilization of productive resources. The reason for assuming that the crisis state is finite-lived is that the analysis emphasizes the degree to which people’s decisions should depend on their expectations. Assuming a two-state Markov process allows one to specify (through the numerical choice of the transition probability) exactly how pessimistic people are about a rapid recovery.

In addition, the NK literature stresses that expectations about what policy will be like once the underlying fundamentals change should be an important determinant of how bad things will be during the crisis. (This theme goes back to [a seminal analysis by Paul Krugman](https://www.brookings.edu/bpea-articles/its-baaack-japans-slump-and-the-return-of-the-liquidity-trap/).) To investigate this issue, a model needs to assume that people expect the crisis situation to last for only a finite time. It should also be noted that the models do not assume that point E is reached because this is what the economy’s long-run situation *must* be. Rather, this follows from an assumption about government policy: it is assumed that the central bank wishes to maintain price stability (zero inflation) if it can. Once fundamentals revert to the normal state, it is possible for the central bank to achieve its target, by setting interest rates so that the AD schedule passes through point E. (In the crisis state, instead, the central bank is unable to maintain price stability; the level of aggregate demand at point S is the most that can be achieved, even when the interest rate is reduced to its effective lower bound.)

Thus while the papers in the NK literature do not typically depict a slump that lasts forever, this is not because the models imply --- or because these papers are intended to teach --- that the economy’s long-run situation is independent of policy, or necessarily benign. Even the long-run equilibrium (including the long-run levels of output and employment) depends on policy; and one of the lessons that the papers seek to establish is that outcomes during a crisis depend on expectations about how policy will be conducted in the long run, and not just on the policy during the crisis. This last point, of course, is one missing from Marglin’s analysis, as a consequence of the purely static nature of the equilibrium relations that he considers, and the purely reactive (and hence myopic) price and wage dynamics that he assumes.

**4. Money and Interest-Rate Determination**

Marglin is especially critical of Keynes’ formulations in the *General Theory* --- and not just the simplifications of subsequent expositors --- with regard to monetary theory. One of the most famous innovations in the *General Theory* was Keynes’ “liquidity preference theory” of interest rates. This was intended to offer an alternative explanation of how interest rates are determined, to explain why they should not in general guarantee an aggregate demand schedule passing through point E, as assumed in the Walrasian model.

Keynes proposed that interest rates adjust so as to cause the private sector to willingly hold money balances of exactly the quantity that exists. This requires that an equilibrium relation of the form

 (6)

must hold. Here *M* is a measure of the money supply, so that *M/P* represents the quantity that can be purchased using that amount of money. The function *L* indicates desired real money balances on the part of the private sector, assumed to be an increasing function of the volume of real transactions (measured by *Y*), and a decreasing function of the nominal interest rate *i* available on non-monetary assets (the opportunity cost of holding money). In the case of a given money supply *M* and a current level of prices *P*, equation (6) indicates the combinations of *Y* and *i* that represent possible equilibria. (This is the “LM curve” of Hicks’ IS-LM model.)

If one combines this with a relation that expresses desired current aggregate spending as a function *Y(i, e)* of the interest rate and other factors (here denoted by *e*) such as expectations regarding future income, one can solve for equilibrium values of *Y* and *i* as functions of *M/P* and *e*. The implied level of current aggregate spending is the quantity shown in Figure 1. Because this is determined by factors unrelated to the locations of the LS and GS schedules, there is no reason that must coincide with , the level of spending that would be required for E to be the short-run equilibrium.

Marglin objects to this theory, because while it succeeds in explaining why need not coincide with at every instant, it provides a mechanism through which aggregate demand shortfalls might be expected to be automatically corrected. The discussion above assumes that both *M* and *P* are given. But if is less than , as assumed in Figure 1, prices should immediately begin to fall. Assuming an unchanged nominal quantity of money *M*, falling prices increase the real money supply *M/P*, and this increases the level of transactions *Y* consistent with equation (6), for any given interest rate. As a consequence, the solution for should increase. Since prices should continue to fall as long as remains less than , one might suppose that this mechanism should result in eventually being exactly equal to , so that the equilibrium corresponds to point E.

Keynes’ response to this possibility was to argue that when interest rates become very low, the function *L(Y, i)* becomes infinitely elastic, so that no further change in either *Y* or *i* is needed in order to get the private sector to hold larger real money balances. In the case of such a “liquidity trap,” further decreases in prices would no longer increase ; hence a point like S in Figure 1 could be sustained indefinitely as an equilibrium, if the level of aggregate demand assumed in the figure corresponds to an interest rate that has already fallen to its lower bound. (This is indeed what is assumed about the “crisis state” in the two-state New Keynesian model discussed in the previous section.) Yet many critics of Keynesian economics questioned how common such a situation would be, if it could occur at all. Others argued that increases in *M/P* should increase aggregate demand through other channels (such as the “real balance effect” hypothesized by Arthur Pigou and Don Patinkin), even if the demand for liquid balances were to become infinitely elastic.

Marglin instead objects to Keynes’ assumption of a fixed money supply *M*, arguing that this might be reasonable as a model of a commodity-money system (in which the money supply might be determined by the existing quantity of some real commodity, such as gold), but that it is grossly inadequate as a representation of a modern monetary system. He notes that the relevant monetary aggregate for a relation like equation (6) should include the money-like liabilities of private institutions (such as transactions balances held at commercial banks), and that the quantity of such liabilities should vary endogenously with business conditions. In particular, he notes that in crises like the Great Depression, the supply of privately-created money often contracts sharply, as a result of loss of confidence in the issuing institutions. When this happens, falling prices need not imply an increase in the real money supply *M/P* --- as indeed they did not during the Great Contraction of 1929-33 in the US, despite severe price deflation.

Marglin also criticizes Keynes’ liquidity preference theory of interest rates in a more fundamental way, pointing out that the opportunity cost of holding money, that appears as an argument of the “liquidity preference function” *L*, should really be an interest-rate *differential.* That is, it should be the difference between the interest rate available on non-monetary stores of value and that available on money balances; this only becomes equal to the nominal interest rate *i* under the assumption that the interest rate paid on money is necessarily zero (in nominal terms). More generally, equilibrium relation (6) should properly be written

, (7)

where  is the nominal interest yield on money balances. Thus, Marglin argues, even on the assumption of a given money supply M, there is no complete theory of interest-rate determination that is independent of government policy. The equilibrium nominal interest rate (and hence aggregate demand as well) depends on , and this ultimately depends on government policy --- specifically, on the interest rate that the central bank pays on overnight balances held with it, and more generally on the complex of interest rates associated with various standing facilities operated by the central bank under a typical modern monetary system. Thus it makes no sense to speak of the level of interest rates as being “market determined,” even on the assumption of a fixed money supply *M*. Interest rates and aggregate demand are both strongly influenced by decisions of the central bank, not only through the ability of central banks to control the quantity of money (emphasized by mid-20th century monetarists), but also through central bank control of various administered interest rates (such as the interest rate on reserves, or IOR, a central policy instrument of the Federal Reserve under current operating procedures).

These criticisms are well-taken, but again the perspective that Marglin advocates is not far from that of the current mainstream literature. The New Keynesian literature that has developed since the 1990s --- since the Federal Reserve’s shift adoption of a policy of publicly announcing its operating target for the federal funds rate (rather than remaining opaque about whether it controlled short-term interest rates) on the one hand, and following the rise to popularity of formulations like the [“Taylor rule”](https://web.stanford.edu/~johntayl/Onlinepaperscombinedbyyear/1993/Discretion_versus_Policy_Rules_in_Practice.pdf) as simple descriptions of actual central-bank policies --- has emphasized central-bank control of a short-term nominal interest rate as a key determinant of aggregate demand. Discussions of how the central bank’s target for the policy rate is implemented in practice stress the relevance of both quantity adjustments (variations in the supply of bank reserves through open-market operations) and adjustments of administered interest rates. Theoretical expositions of how this works often use an equilibrium relation similar to equation (7). (See for example the treatment of these issues in chapters 1 and 2 of [my book](https://press.princeton.edu/books/hardcover/9780691010496/interest-and-prices).)

It should also be noted that while Marglin criticizes Keynes for relying upon the doctrine of the “liquidity trap” to explain how a sustained slump is possible, the Keynesian liquidity trap has proven to be a surprisingly relevant idea for understanding macroeconomic developments and policy challenges in the wake of the global financial crisis of 2008. The idea that the demand for base money becomes highly elastic when the differential becomes negligible proved to be correct, and important for understanding why massive expansions of central banks’ monetary liabilities in response to the crisis were not inflationary (contrary to the warnings of commentators who had never accepted the logic of the *General Theory*).

And the simple idea of a lower bound, not simply on the interest differential , but on the absolute level of money-market interest rates, turned out to be right. While the form of the liquidity preference function only limits the ability to reduce , there have also proven to be important practical limits on the ability of central banks to reduce much below zero. Thus the fact that interest rates can be influenced by varying is important when thinking about the ways in which a central bank can raise interest rates well *above* zero; it implies, for example, that restraint of aggregate demand for the sake of inflation control need not require a central bank to reduce the size of its credit or liquidity programs, in order to be able to contract the size of its balance sheet. But this refinement of traditional theory does not much change one’s view of policy options in a deflationary crisis, since in such a situation the central bank will wish to maintain fixed at a lower bound that is near zero, even if it recognizes that is an additional policy instrument.

Thus Keynes’ proposal that there should be a bound on how far short-term nominal interest rates can fall, even in the case of a massive expansion of the monetary liabilities of the central bank, has been tested by many of the leading central banks (both in response to the crisis of 2008 and in response to the COVID-19 pandemic), and shown to be true, at least to a first approximation. This has led policymakers to contemplate other tools through which to influence aggregate demand --- both renewed interest in fiscal stimulus policies, and novel experiments with forward guidance in monetary policy.

**5. What is Left of Natural Rate Theory?**

Marglin mounts a frontal assault on the view that the economy’s state at each point in time should be modeled as a Walrasian equilibrium --- a situation in which not only are all economic units wage- and price-takers, but wages and prices can be assumed to automatically find the levels such that all markets clear at each instant. But while the Walrasian vision has remained influential in contemporary macroeconomics (notably among real business cycle theorists), this is not Marglin’s only target. Many economists would agree that the economy can depart from a Walrasian equilibrium temporarily, and that aggregate demand is relevant to the determination of economic activity *in the short run.* But even these often suppose that any departures from Walrasian equilibrium are necessarily temporary, and thus that aggregate demand is of no relevance for longer-run outcomes.

This view was famously articulated by Milton Friedman in his [Presidential Address](https://www.aeaweb.org/aer/top20/58.1.1-17.pdf) to the American Economic Association, where he introduced the concept of a “natural rate” of output (and a corresponding “natural rate of unemployment”), defined as “the level that would be ground out by the Walrasian system of general equilibrium equations” (p. 8). Friedman argued that while departures from this “natural rate” could occur temporarily, and these temporary departures could be influenced by monetary policy, output would have to equal the natural rate on average over the longer run, regardless of how monetary policy was conducted.

Marglin challenges not merely the view that the economy should be in a state of Walrasian equilibrium at all times, but also the view that there is any automatic mechanism that ensures that the economy must reach such a state eventually, in the absence of suitable demand management policy. Thus his analysis directly challenges the view that it makes sense to speak of a “natural rate” of output, determined by factors such as the available productive resources and the state of technology, but completely independent of monetary policy or other forms of demand management policy. And indeed, several of the later chapters of the book are devoted to discussion of the relevance of aggregate demand for long-run economic growth. This aspect of his analysis provides a broader challenge to mainstream thinking in macroeconomics, where long-run neutrality propositions are widely accepted, not only by followers of Milton Friedman, but also those persuaded by Paul Samuelson’s “neoclassical synthesis.”

The discussion in section 3 above should have made clear that Marglin’s view on this matter is consistent with an insistence upon using structural relations that are fully “micro-founded” in terms of explicit individual optimization problems. In particular, standard New Keynesian models do not imply that there is any reason for the actual level of economic activity to be equal to some policy-independent “natural rate” on average, regardless of how policy is conducted. It is possible for the economy to remain away from the situation represented by point E in Figure 1 for an indefinite period of time; as discussed above, this should result in changing wages and prices (in monetary units), but without the level of real activity or employment having to change.

This has probably not been made as clear in the NK literature as it could have been. One reason is that in analyses of the predicted dynamics of the economy under alternative policy rules, it is common to log-linearize the model structural equations around a stationary equilibrium with no inflation, to assume that real disturbances are purely transitory in character, and to consider only policy rules (such as a “Taylor rule” for monetary policy) that imply mean-reverting dynamics. In such a calculation, variables like aggregate output, hours worked, and the real wage are depicted as expected to return fairly quickly to the values associated with the zero-inflation stationary equilibrium following any random “shock” (whether a shock to policy or to economic fundamentals). Moreover, since departures from the stationary equilibrium occur only in response to unexpected disturbances, that (by definition) are equally likely to occur in either direction, the economy is depicted (at least in a linear approximation) as having a level of output and other real variables that are equal on average, over the long run, to those in the stationary equilibrium. And the allocation of resources in the zero-inflation stationary equilibrium is (at least in simple models) the same as in an equilibrium with perfectly flexible wages and prices. Thus the models might seem to imply that one can count on output to be equal to the “natural rate of output” both on average and in the long run following any temporary disturbance.

However, it should be noted that these results obtain only because of particular assumptions, in particular, regarding the class of policies that are considered. One does not obtain convergence to the natural rate of output following a shock regardless of the kind of policy that is assumed; this occurs only because a policy rule is assumed that is consistent with stable prices in the absence of shocks, and the rule responds to departures from the low-inflation stationary equilibrium in a way that leads to stabilizing dynamics. The model does not imply that the economy must fluctuate around the natural rate regardless of what policymakers may seek to achieve; rather, it implies that under certain circumstances (supposed to represent “normal” conditions, but not necessarily those that arise during a severe financial crisis) it is *possible for policy to ensure* that the economy will fluctuate around the natural rate, departing from it only temporarily. This is often assumed to be what stabilization policy is trying to achieve; hence the interest in studying policies that (according to the models) lead to outcomes of this kind. But the point of the analysis is to consider what it should mean to conduct policy well, rather than to imply that policy doesn’t matter.

So Marglin is right to emphasize the absence of mechanisms that guarantee that the economy must reach point E in Figure 1, even in the long run, in the absence of suitable policy. He is also right to emphasize the possibility of using government policy (both monetary and fiscal policy) to keep the economy closer to that point, by shifting the AD schedule so that it passes through point E. His book does a great service by making these points so clearly.

But before the reader concludes that discussions of the “natural rates” of various real variables are useless (or worse), two comments are in order. First, the concepts of a “natural rate of output,” a “natural rate of interest,” and so on, can be analytically useful, even if one denies the Friedmanite proposition that real variables must equal their natural rates on average over the long run. This is because “gaps” between the actual values of variables and their “natural” values can be useful for understanding the degree to which market forces should tend to cause wages and prices to change.

In the version of Marglin’s model summarized above (equation (1)), the rate of increase or decrease of goods prices depends on the degree to which actual output *Y* differs from . In the full version of his model, in which both wages and prices take time to adjust, there is another differential equation, giving the rate of increase or decrease in wages as a function of the degree to which *Y* differs from the level of output consistent with the LS schedule. Thus to understand the degree to which market forces should lead wages and prices to adjust over time, there are two “gaps” that one needs to measure: the distance of the economy’s current level of output from the GS schedule on the one hand, and its distance from the LS schedule on the other, given current wages and prices.

In a log-linearized version of the model --- in which each schedule is expressed as a linear relationship between log *Y* and log(*P/W*), with constant coefficients, but an intercept that shifts over time in response to disturbances to preferences, productivity, demographics, market power, etc. --- one can alternatively express the values of the two gaps at any point in time as linear combinations of two other gaps: the “output gap” log *Y* – log , and the corresponding “real wage gap” log (W/P) – log(W/P)E. The ways in which different sorts of changes in economic fundamentals shift the two schedules are then completely summarized by the implied changes over time in the natural rate of output and the natural real wage. (For an NK model of wage and price dynamics in terms of these two gaps, see chapter 5 of [my book](https://press.princeton.edu/books/hardcover/9780691010496/interest-and-prices).)

Whether one prefers to discuss structural change in the economy by asking “how much have the GS and LS schedules shifted?” or by asking “how much have the natural rate of output and the natural real wage shifted?” is perhaps a matter of taste. But an advantage of the Wicksellian “natural rate” language is that it allows one to talk about variables that can be given a meaning outside the context of a particular structural macroeconomic model. Two members of a policy committee can discuss how much each of them believes a recent change in the economy is likely to have impacted the natural rate of output (i.e., they can discuss what they think real GDP would be under the counterfactual assumption of perfectly flexible wages and prices) without their having to agree on the details of the model that each of them uses to think through such questions. A discussion of “how much the GS schedule has shifted” instead requires more of an agreement to think in terms of a common system of equations, and so is less likely to be found congenial by actual policy committees.

And second, it should be stressed that the mere fact that there is no mechanism that guarantees that output must equal the natural rate, either on average or in the long run, does not mean that policy can and should be formulated without thinking at all about how the current or projected level of economic activity compares with the natural rate. In particular, it should be remembered that Friedman’s reason for introducing his natural rate theory was to warn (in the context of US policy in the late 1960s) against running the economy at too “hot” a level through expansionary fiscal and monetary policies. Friedman argued that this was a recipe for high inflation without any persistent benefits for output and employment. In the event, the US economy did indeed suffer high and unstable inflation, combined with high unemployment and a growth slowdown. Ignoring the limits to what expansionary policies could realistically achieve proved to be an important mistake.

Marglin’s model implies that it should be equally possible for output to remain persistently above , just as it can remain persistently below , if aggregate demand is not in line with supply conditions. But it also implies that neither of those situations should be consistent with stable wages and prices. And there is an important difference with regard to the practical implications of wage and price adjustment on the two sides of the “natural rate.” If aggregate demand is insufficient, so that < , wages and prices should fall. To the extent that this process is disruptive, that only strengthens the point that one cannot expect automatic market mechanisms to save the economy from the dire effects of the aggregate demand shortfall. But if aggregate demand is excessive, so that > , wages and prices must rise. And if the excess demand is more than modest in size, and lasts long enough for expectations of continuing inflation to become entrenched, the resulting wage-price spiral is likely to create substantial distortions.

In fact, there need not be any finite rate of wage and price inflation consistent with a given positive output gap, once that rate of inflation comes to be expected. (In the NK model, it isn’t true that the “long-run Phillips curve’’ is perfectly vertical, as natural rate theory asserts; but typical calibrations do often imply that it is backward-bending beyond a relatively modest positive output gap.) This doesn’t mean that it is technically impossible to maintain a larger positive output gap, but it does mean that the economic and financial disruption resulting from an effort to do so is likely to become increasingly severe.

Thus while there is no automatic mechanism that ensures that aggregate demand must (even eventually) come to be perfectly in line with aggregate supply, the import of this insight is different in the case of an aggregate demand shortfall as opposed to one of excess aggregate demand. In the case of insufficient aggregate demand, it is important to recognize that market mechanisms cannot be expected to cure the problem on their own; policy intervention may well be needed, even though actual policies are inevitably less precise in their timing and targeting than the ideal policies that are so easy to discuss on the blackboard. But in the case of excess aggregate demand, it is not a bad rule of thumb for policymakers to act as though it is not feasible to maintain a level of economic activity consistently in excess of the natural rate. The claim that market mechanisms somehow get one to the Walrasian equilibrium cannot be theoretically justified; yet skepticism about the desirability of aiming for a level of economic activity consistently above the natural rate remains prudent.

This is not simply a superstition promoted in order to protect the interests of bondholders. Labor, the labor movement, and above all the reputation of labor-allied political parties for competence in economic management suffered grievously from the inflation of the 1970s. Economists do well to be careful about suggesting that there are no limits to extent to which stronger economic growth can be achieved simply through sufficient support for aggregate demand.