CHAPTER 3

Policy illusion, macroeconomic instability, and the unrecorded economy

ROBERT T. MCGEE and EDGAR L. FEIGE

During the decade of the 1970's, many Western economies unexpectedly suffered through periods of high unemployment, slowed economic growth, and high rates of inflation. In the 1980's, the major problem has become high interest rates and massive government deficits. The discrepancy between the factual observations of macroeconomic phenomena and the traditional theories that sought to explain them has created disillusion with the economics profession and the perception that macroeconomics in particular is in a state of crisis. Ad hoc modifications of conventional theories and innovative alternative explanations of stagflation and rising deficits have provided economists with a host of doctrinal issues to dispute. However, the absence of any consensus on the underlying causes and cures for these economic maladies has left the economics profession and policymakers in a state of great uncertainty as they confront a deteriorating situation. It is now apparent that the professional optimism that characterized the decade of the 1960's was shattered by the economic record of the 1970's. The prospects for the present decade will depend upon our ability to correctly diagnose what went wrong in the last one.

In the decade of the 1960's, the U.S. economy enjoyed an average rate of inflation of 2.8% combined with an average rate of unemployment of 4.7%, whereas during the 1970's, the economy experienced inflation at 6.6% and unemployment at 6.2%. The enthusiastic profession of the 1960's believed that it was possible to fine tune an economy that was thought to be characterized by a trade-off between inflation and unemployment. The disillusioned economists of the 1970's sought explanations for the unprecedented increases in both inflation and unemployment in ad hoc supply shocks such as the formation of the OPEC cartel. Rational expectations and natural rate of unemployment theories were elaborately specified to explain the emasculation of economic policy and the predictive failures of large-scale econometric models. Monetarists sought refuge in the claim that their recommendations had not adequately been put in practice, whereas Keynesian economists blamed the spread of monetarist doctrines. Neoclassical

economists placed stringent rationality and market-clearing constraints on their models even as neo-Keynesians sought out market imperfections and behavioral irrationalities as the explanation of stagflation. The long-standing tradition of demand-oriented macrotheory reluctantly, but precipitously, embraced the promises of supply side economics. Amidst this intellectual pandemonium, economic facts stubbornly defied the most creative efforts to reconstruct an apparently failing theory.

Recently, yet another hypothesis has been advanced by Feige (1980; see also Chapter 1) as a possible explanation of the widening gap between observed economic facts and received economic theory. The unrecorded income hypothesis suggests that perhaps it is the economic facts that require scrutiny rather than the economic theories. According to this perspective, the growth of an unrecorded economy has distorted the official information system that is sending the current signals of economic malaise. As economic activity shifts from the recorded to the unrecorded sector, some basic economic indicators such as real growth rates, employment, and productivity may become understated. As false reporting and non-reporting becomes endemic among individuals and firms as a result of growing incentives and preferences to avoid the scrutiny of governmental data collection agencies, social indicators become contaminated by the process Alford and Feige (Chapter 2) describe as "observer–subject feedback." A growing body of empirical evidence suggests that the unrecorded economy is of substantial magnitude and has grown during the decade of the 1970's in many of the world's most highly developed economies.

The promise of the unrecorded income hypothesis is that it offers an alternative perspective on the current state of economic malaise. By shifting the emphasis away from a restructuring of received theory toward an investigation of the reliability of economic "facts," the perspective raises an entirely different set of questions to be asked and seeks answers that may at once be consistent with traditional theory and the facts of economic life.

If it is the case that social indicators are themselves corruptible and can produce misleading information to both the public and policymakers, then we must inquire into the nature and magnitude of such distortions and examine the implications of an information system capable of producing systematically false signals. We may well be in a position to retain the assumption of behavioral rationality on which so much of our theory is based once we realize that rational individuals and policymakers will nevertheless produce irrational outcomes if the information basis for their decisions is systematically distorted.

Dynamic descriptions of economic systems require specifications of expectation formation behavior. Rather than replace the powerful assumption that expectations are conditioned by available information in a rational manner, with alternatives based on asymmetric illusions, we seek to investigate the consequences of rational expectation formation based on irrational information. The fundamental illusion that may exist within the economy, and among those who study it, is the assumption that the economic facts that motivate behavior are accurate or at least unbiased. The unrecorded income hypothesis provides a conceptual challenge to this deep-seated belief. It offers an alternative characterization of a dynamic social mechanism that tends to distort the information base established to describe the system itself.

As a result of high marginal tax rates and other costly government regulations, individuals and firms have economic incentives to hide their activities from governmental data collection agencies. Whereas individual economic actors may still have relatively accurate information concerning their own economic circumstances, they nevertheless rely on broad social indicators for gauging the general economic situation. Survey results suggest that individuals appear to be much more optimistic about their personal economic situation than about the general economic situation. This is precisely what would be expected when aggregate data based on false reporting produce the statistical illusion of economic malaise. If policymakers and citizens respond to false information signals, this can produce genuine economic malaise. What is required then is the formulation of a macroeconomic model that takes explicit account of a growing unrecorded economy and traces the implications of such a phenomenon on the dynamics of the economic system.

Feige (1980, p. 57) presented some suggestions concerning the formulation of such a model:

> Such a model would incorporate the various incentives and costs relevant to inter-sectorial shifts of resources...The model would specify the dynamic behavior of individuals, firms, and governments as they respond to official information that is systematically biased in directions previously described. Such a model would be capable of demonstrating formally that an exogenous shock to the system, such as supply shocks, higher taxes, or political disillusionment, could induce major shifts between the recorded and the unrecorded sectors. Such shifts in turn would affect official statistics in such a way as to induce the appearance of stagflation symptoms, which; in their turn, could lead to economic behaviors that transform the illusion of stagflation into the reality of stagflation. Such a model would depart from conventional equilibrium assumptions and would seek instead to define the necessary and sufficient conditions under which the hypothesized dynamic instability would occur.

This chapter is a preliminary attempt to formally introduce some of these ideas into a standard macroeconomic model. Our major concern is with the effects of "policy illusion," namely, the process whereby policymakers react to observed economic information without regard to the existence of the unrecorded economy. We will demonstrate that under a wide range of plausible conditions, well-intentioned policy action based on information gathered solely from the recorded sector will lead to stagflation in the recorded economy. The growth of the unrecorded sector will produce symptoms of economic decline that are transformed into actual stagflation as a direct result of policy illusion.

Our aim in this chapter is not to enter into the current disputes of the theoretical literature of macroeconomics but rather to show how the phenomenon of an unrecorded sector can be incorporated into existing macromodels to gain alternative insights into macrodynamics. To this end, we present in the text a simple graphical description of the consequences of both exogenous and endogenous growth in the unrecorded economy, focusing attention on the consequences of policy reactions to misinformation. The technical model that underlies the graphical analysis is presented in the Appendix. The basic model that describes the economy is adapted from McGee (1982) and extended to include both recorded and unrecorded sectors. The basic model is an aggregate dynamic model of income determination that is rich enough to permit both the monetary neutrality results of rational expectations and natural rate models and the non-neutrality results stemming from Tobin-type asset effects and tax-induced supply side effects. The model is therefore capable of examining the consequences of both monetary and fiscal policies under conditions of downward sloping, upward sloping, and vertical Phillips curves.

The nature of the problem

The theoretical issues posed by macroeconomists in the last decades have clearly been motivated by their observations of the facts of economic life. Just as Keynes's general theory was fundamentally shaped by the factual experience of the Great Depression, so has recent theoretical inquiry been molded by the economic record of the past two decades. The record is based on official government statistics and is most easily summarized in the changing relationship between the rate of inflation and the level of unemployment. As Figure 3.1 reveals, unemployment rates steadily declined with only modest increases in the rate of inflation during the decade of the 1960's. The subsequent decade was charac-

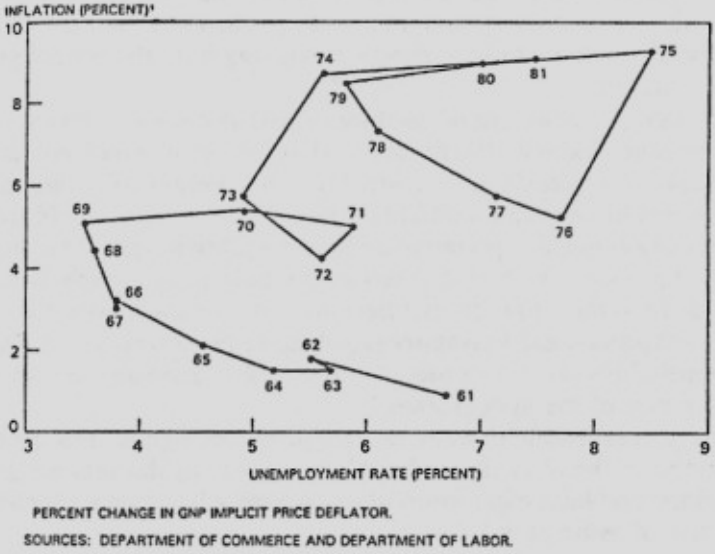

Figure 3.1. Inflation and unemployment rate.

terized by a drift toward higher inflation rates and higher levels of unemployment.

The economists of the 1960's attributed the salutary economic record to their own subtle manipulations of policy control variables, whereas the economists of the 1970's sought to blame structural economic change and policy blunders for the dismal record. In neither decade was the record itself challenged.

Feige (Chapter 1, Figure 1.6) estimated the relative growth of the monetary unrecorded economy in the United States during the decades of the 1960's and 1970's. What is startling about these estimates is the dramatic growth displayed in the unrecorded sector beginning in 1966 and continuing with two temporary reversals during the decade of the 1970's. The estimates suggest that the unrecorded sector remained essentially a fixed proportion of the recorded sector during much of the 1950's and 1960's. On the other hand, the rapid relative growth of the unrecorded sector in the 1970's may have introduced systematic distortions in more recent official government statistics. These statistics serve as the fundamental information base for government policy. We there-

fore entertain the possibility that at least a part of the instability of the inflation–unemployment relationship described in the preceding may be attributable to false signals emanating from the official government statistics.

The rational expectation literature raised the question of what restriction must be placed on the formation of information-based expectations such that expectations be consistent with a general equilibrium model. Our aim is to entertain a different question; namely, how will the properties of a rational expectation general equilibrium system be modified when the system itself is shocked by an exogenous growth in the unrecorded economy that distorts the information basis used in the formation of expectations? Furthermore, what are the properties of a system in which shifts from recorded to unrecorded activities are an endogenous part of the system itself?

The general equilibrium model employed throughout this chapter is described in detail in the technical Appendix. In the text we present simplified graphical expositions of the system's dynamics under alternative sets of assumptions.

The vertical Phillips curve and full-employment policy

The first regime we consider is an economy with a vertical Phillips curve. The monetary authority is charged with the activist responsibility of maintaining full employment. Figure 3.2 illustrates an initially stable economy with a zero inflation–full employment equilibrium point at A. The model is constructed to conform to the prevailing rational expectation–natural rate view where stability occurs when monetary growth $\dot{m}$ equals the rate of growth of real income $\dot{y}$. The initial full employment–zero inflation equilibrium A is maintained so long as $\dot{m} = \dot{y}$. Any attempt to push the unemployment rate U below its natural rate U_n will induce movements along the vertical Phillips curve, raising inflation without producing any lasting effect on the unemployment rate U_n.

Consider the consequences of an exogenous once-and-for-all increase in the unrecorded economy. An external shock to public confidence in government such as the Vietnam War or the Watergate episode could trigger a shift from the recorded to the unrecorded economy. Income and employment shift off the books, and individuals previously employed in the recorded sector shift to unrecorded jobs, declaring themselves unemployed. Since recorded unemployment increases for all inflation rates, the observed Phillips curve shifts to the right. The new observed unemployment rate is U_1^o, and this in turn induces a monetary expansion to $\dot{m}_1$. The monetary authorities' reaction is pictured in the

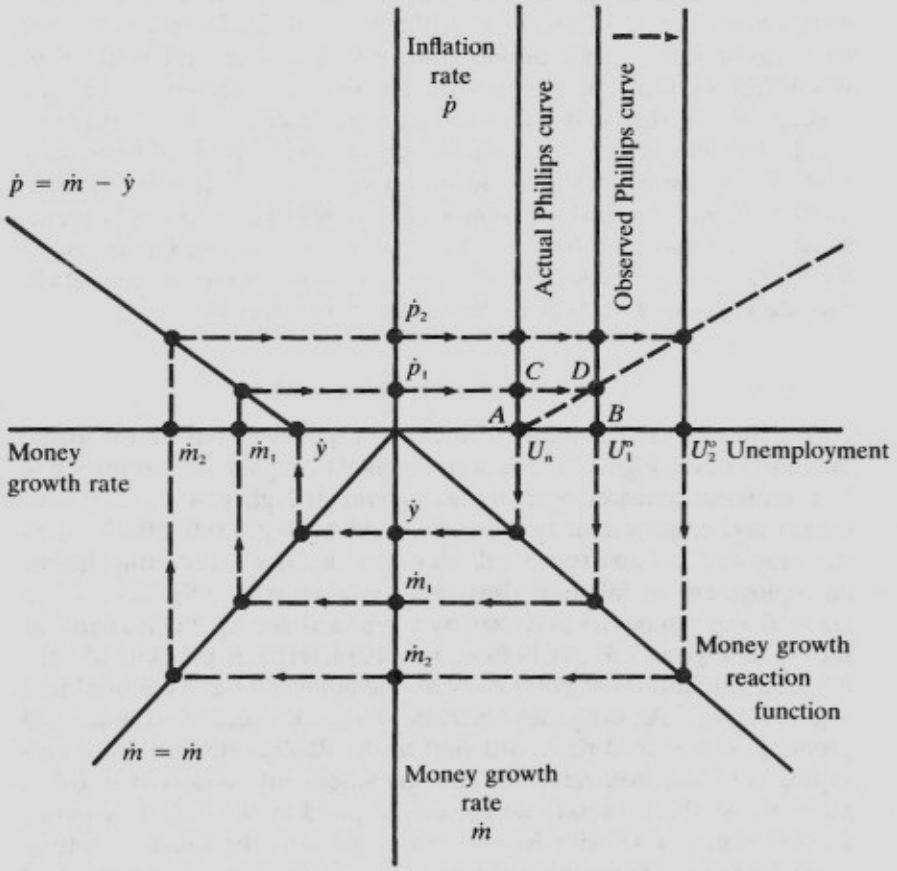

Figure 3.2. Effect of exogenous shift to unrecorded sector where long-run Phillips curve is vertical and monetary policy is counter cyclical.

lower right quadrant and represents an activist counter cyclical policy. The higher growth rate in the money supply in turn raises the inflation rate to $\dot{p}_1$ since money growth now exceeds the growth rate of real income. A new equilibrium is established with actual unemployment at its former level U_n, observed unemployment at U_1^o, and a higher inflation $\dot{p}_1$. Thus, the effect of a once-and-for-all shift in the composition of total employment from observed to unrecorded employment will move the economy from an observed position A to the illusionary position D, which will be maintained. The result is the appearance of stagflation. Although there has been no change in actual unemploy-

ment, observed unemployment is higher, and there has been an actual increase in the rate of inflation. If the external shocks to public trust continue or if the public disillusionment with government policy provokes further shifts to the right in the observed Phillips curve, the process will be repeated. Observed unemployment rates will increase, and higher inflation moves the economy to a new observed point such as E. Every exogenous increase in unrecorded activity will stimulate another round of actual inflation and observed higher unemployment. Hence, stagflation will be observed as an upward sloping Phillips curve along points ADE even though the actual economy is structurally characterized by a vertical Phillips curve through point A.

An upward sloping Phillips curve

An additional complication is added for policymakers if the rising inflation rates in Figure 3.2 are accompanied by higher real tax rates due to insufficient indexation of the tax system. If higher tax rates reduce output and employment because of negative supply side effects, then the long-run Phillips curve will slope to the right, reflecting higher unemployment as inflation rises. An economy with inflation-induced tax increases can be characterized by an upward sloping Phillips curve as shown in Figure 3.3. As before, we characterize a position of zero inflation equilibrium at point A, with unemployment at its natural rate U_n, and $\dot{m} = \dot{y}$. An exogenous increase in the unrecorded economy will produce an observed rightward shift in the Phillips curve. At the prevailing zero inflation rate, the unemployment rate observed is U_0^o at point B. As the monetary authorities respond to the higher observed unemployment rate with higher money growth, the inflation rate is pushed up to $\dot{p}_1$. Since the real tax rate is assumed to rise as a result of inflation-induced bracket creep, real supply side effects raise actual unemployment to point C and observed unemployment to U_1^o at point D. The higher observed unemployment again induces a "countercyclical" policy response that has the unintended consequence of producing both actual and observed stagflation. So long as the monetary authority maintains its "full-employment" policy objective, it paradoxically initiates a real as well as an observed stagflation spiral. If external shocks to the system bring on further shifts toward the unrecorded sector, this tendency toward an explosive system will become even more exaggerated as the observed Phillips curve continues to shift rightward.

We have demonstrated that an initial illusion in the information system induced by a once-and-for-all increase in the unrecorded economy can transform an otherwise stable equilibrium into an unstable

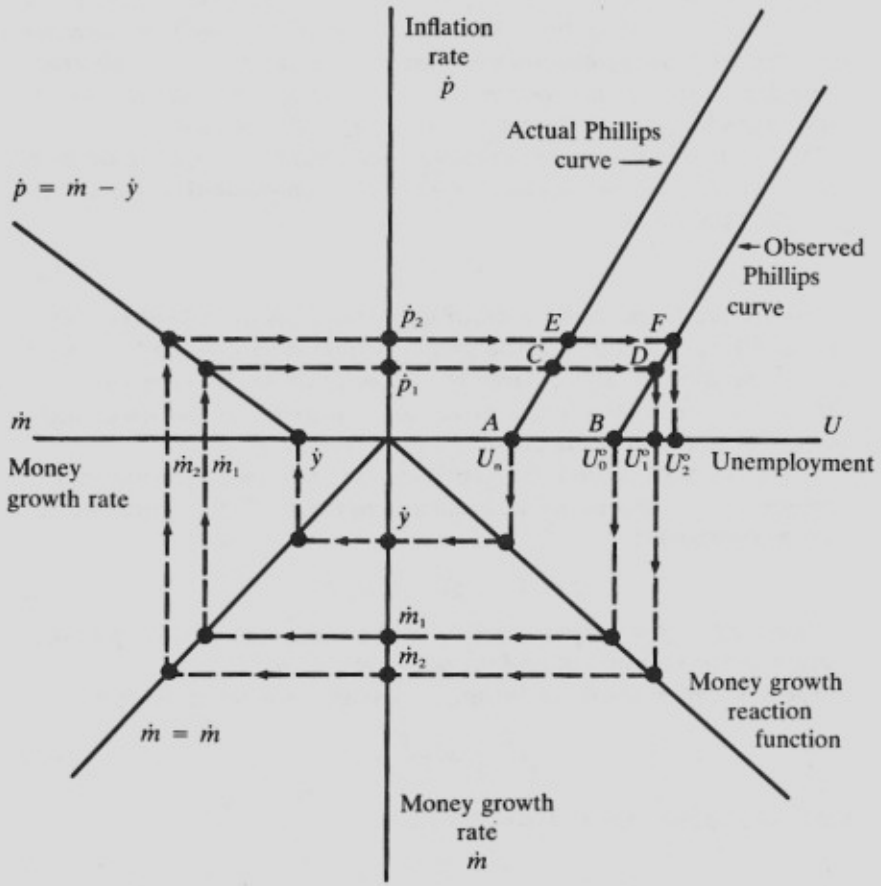

Figure 3.3. Effect of exogenous shift to unrecorded sector where long-run Phillips curve is upward sloping and monetary policy is counter cyclical.

system characterized by a real stagflation explosion. The mere illusion of economic malaise is translated into the reality of economic chaos.

A further complication arises if the tax increases induced by inflation stimulated in turn endogenous increases in the unrecorded sector. Until now, we have treated the unrecorded sector as if it was exogenously determined entirely by citizens' attitudes toward government. If attitudes toward government remain unchanged, it is still possible that the unrecorded economy will increase solely due to economic incentives to hide more income in response to higher taxes.

To illustrate this endogeneity, we consider the simple model of the unrecorded sector presented in Feige and McGee (1983). We assume that the unrecorded economy is structured similarly to the observed economy. Thus, for the moment we ignore efficiency and productivity differences between the observed and unrecorded economy.

We assume that the representative household's preferences for unrecorded versus observed sector output can be represented by the Cobb–Douglas utility function:

$$U = cY_o^{\lambda}Y_u^{1-\lambda} \tag{3.1}$$

Output produced in the unrecorded sector Y_u is priced below output in the observed sector Y_o. The price discount is simply the tax rate θ. This price differential is assured by the assumption that competition in the unrecorded sector forces prices to correspond to the lower input costs of production made possible by evaded taxes.

The amount of income the representative household decides not to disclose is determined by maximizing equation (3.1) subject to the income constraint:

$$I - Y_o - (1 - \theta)Y_u = 0 \tag{3.2}$$

Observed sector output is taken as the numeraire good, and unrecorded sector output is therefore priced at $1 - \theta$.

The first-order condition for utility maximization requires that

$$\frac{\lambda}{1 - \lambda} = \frac{Y_o}{1 - \theta}Y_u \tag{3.3}$$

Since total output is constrained by

$$Y = Y_o + Y_u \tag{3.4}$$

where $Y_o = \gamma Y$ and $Y_u = (1 - \gamma)Y$, we can rewrite (3.3) as

$$\gamma = \frac{\lambda(1 - \theta)}{1 - \lambda\theta} \tag{3.5}$$

where γ is the share of actual output observed.

From (3.5), we note that the observed sector's share of total output decreases as tax rates rise and increases as preferences for observed sector output (λ) increase. This preference parameter (λ) reflects a myriad of social and political attitudes toward government that include trust and public morality. Its explicit inclusion as a parameter of the utility function permits the introduction of non-economic qualitative effects that are typically not considered in economics since preferences are taken as given and fixed.

Equation (3.5) provides the necessary linkage between tax policy and the unrecorded sector. As inflation increases in a regime with progressive taxation and inadequate indexation, real tax rates will rise. The impact of this endogenous increase in tax rates on the allocation of income between the observed and unrecorded sector is in addition to the more conventional supply side effects of higher taxes in reducing labor and capital supply and hence the tax base.

Figure 3.4 illustrates the consequences of introducing an endogenous shift to the unrecorded sector as a result of inflation-induced tax rate increases. As before, we begin the analysis with a zero inflation–full employment equilibrium at A and disturb the system with a once-and-for-all exogenous shift toward unrecorded activity. The Phillips curve is observed as being displaced to the right with observed unemployment at U_0^o. In response to higher observed levels of unemployment, the monetary authority (committed to a full-employment policy) raises the money growth rate with its consequent effect on inflation. At the higher inflation rate $\dot{p}_1$, bracket creep pushes individuals into higher tax brackets, increasing the effective real tax rate. The consequence of the induced higher tax rate can be partitioned into two separate effects. The first represents a pure supply side effect that moves the economy along the actual Phillips curve from A to C and along the observed Phillips curve from B to D.

Both actual and observed unemployment are higher as factors reduce their supplies in response to the higher tax wedge. In addition to this pure supply effect, there is an induced shift of activity from the observed to the unrecorded sector as a result of the higher incentive to underreport income. This endogenous shift to the unrecorded sector is displayed as a rightward rotation of the observed Phillips curve along a trajectory BEH. The higher observed unemployment represented by U_2^o can be decomposed into an illusionary rise in unemployment caused by the original exogenous shift to the unrecorded sector $U_0^o - U_n$; the real increase in unemployment reflected in the movement from point B to D, which reflects an induced supply side contraction; and a further illusionary increase in unemployment that results from the tax-induced shift to the unrecorded sector (D–E). The combined effect is to raise observed unemployment to U_1^o, which in turn stimulates monetary expansion. As displayed in Figure 3.4, the continued adherence to a full-employment activist monetary policy produces a stagflation spiral, raising inflation rates as well as actual and observed unemployment. The endogenous shifts to the unrecorded sector are seen to further the dynamic instability of the model.

Three factors contribute to the problem we have described. First and

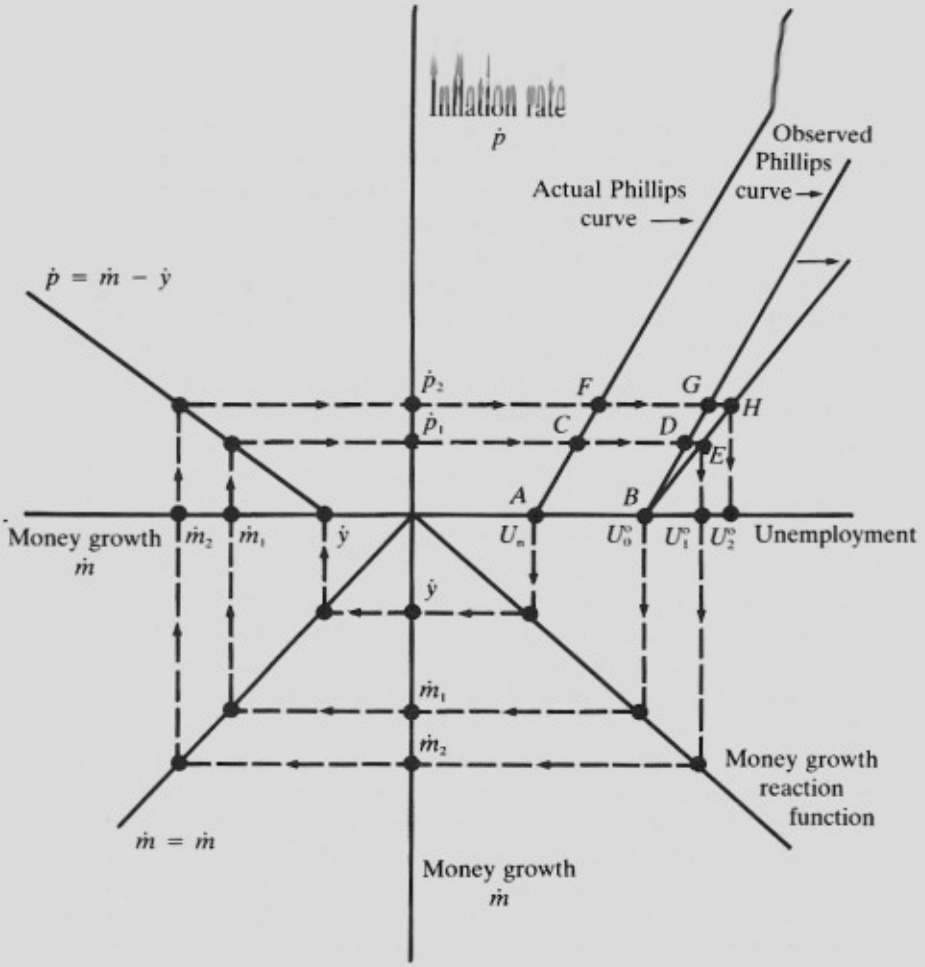

Figure 3.4. Effect of exogenous and endogenous shifts to unrecorded sector. Upward sloping Phillips curve and countercyclical monetary policy.

foremost is the distorted information produced by a shift to unrecorded activity. Second is the continued adherence to an activist countercyclical policy that itself is triggered by false information. Third, we have the effect of bracket creep. The identification of the problems suggests some possible solutions. The first requirement is to find methods for distinguishing between real and imaginary changes in the social indicators that trigger government policies. Once known, policy thermostats can be recalibrated to account for illusionary unemployment increases. Furthermore, tax systems can be indexed so as to eliminate the rise in real taxes

induced by inflation. This latter suggestion has been incorporated into the Reagan administration tax program but is presently being threatened by political pressure for higher non-legislated taxes. Finally, the illustration makes clear the dangers of strict adherence to activist countercyclical monetary policy, particularly when that policy appears to fail in its objective. These exercises illustrate the possibility that a healthy economy directed by well-intentioned policymakers can be driven into the reality of an explosive stagflation situation as the result of an unrecognized shift from observed to unrecorded activity.

One apparent solution to the problem of dynamic stagflation is to abandon the countercyclical monetary policy and adopt in its place a fixed money growth rule. This policy change can be represented in Figure 3.4 by a counterclockwise rotation of the money growth reaction function that brings it parallel to the horizontal axis at a selected fixed growth rate of the money supply. The new policy would reverse the upward spiral in inflations and thus reverse the growth in unrecorded sector activity induced by bracket creep. However, as we shall see in the following section, it would be premature to conclude that indexation of the tax system and abandonment of the full-employment monetary policy represent costless solutions to the problems created by the growth of unrecorded activities.

Price stability targets and fiscal automatic stabilizers

In the previous sections, we analyzed the consequences of shifts to the unrecorded sector in an economy where the monetary authority was committed to an activist countercyclical policy. In such an economy, monetary policy typically operates to stabilize interest rates while permitting larger swings in money growth rates. To the extent that private credit demands are accommodated and government deficits are partially monetized, real interest rates will tend to be relatively low even when nominal interest rates rise pari passu with inflation. Such was the case during the 1970's as monetary policy accommodated rising credit demand.

In October 1979, the Federal Reserve adopted a new policy of stricter control of the growth of monetary aggregates with a view toward utilizing monetary control as the primary weapon against inflation. Interest rate stabilization and full-employment goals for monetary policy were abandoned in favor of the monetarist recommendations for stricter control of monetary growth in order to reduce inflation. One consequence of this policy change was the rise in real interest rates that became a major source of contention between the United States and Europe.

Our aim in this section is to consider the consequences of a shift to the unrecorded sector, in an economy where the monetary authorities are strictly committed to price stability via a fixed rule for monetary growth. In such a regime, monetary policy can no longer serve to accommodate public credit demands through monetary expansion, and thus fiscal deficits must be financed through heavier borrowing from the public. Since monetary policy is now aimed at a price stability target, the burden of income and employment stabilization falls more heavily on fiscal policy. We shall assume that the fiscal authorities rely primarily on automatic stabilizers that act to increase expenditures during periods of unemployment. Similarly, tax revenues will tend to shrink during periods of recession as the tax base contracts in the face of a fixed tax rate schedule.

Figure 3.5 illustrates the consequences of an exogenous shift to the unrecorded sector in an economy with a monetary price stability target and fiscal policy based on automatic stabilizers. We assume that the monetary authorities succeed in fixing a money growth rule with the effect of stabilizing the rate of inflation at some low level. As such, the rate of inflation can be ignored in the subsequent analysis.

Line *ACE* in the upper right quadrant of Figure 3.5 represents the locus of values of real interest rates and the unemployment rate consistent with equilibrium in the model. Higher real interest rates are associated with higher rates of unemployment since the economy's capacity declines with higher real interest rates. As real interest rates rise, previous economically feasible investment opportunities are eliminated, with a resulting fall in the economy's capital stock and a consequent decline in the demand for labor.

The lower right quadrant represents the endogenous relationship between the level of unemployment and the level of real government debt per capita. As unemployment rises, tax revenues fall as the income tax base shrinks at the very time that government expenditures rise to meet the higher need for unemployment benefits and other recession-linked social payments. Since monetary growth is fixed, the revenue shortfalls must be financed by public borrowing, which increases pressure on interest rates. We have represented the locus of equilibrium unemployment and government debt as a simple linear function; however, it is possible that as a result of higher interest payments on the existing debt, the curve may actually be non-linear, with government borrowing growing in greater proportion to increases in unemployment. This effect will simply strengthen the results that follow.

The upper left quadrant of Figure 3.5 shows the equilibrium relationship between the government's debt and the real rate of interest. This

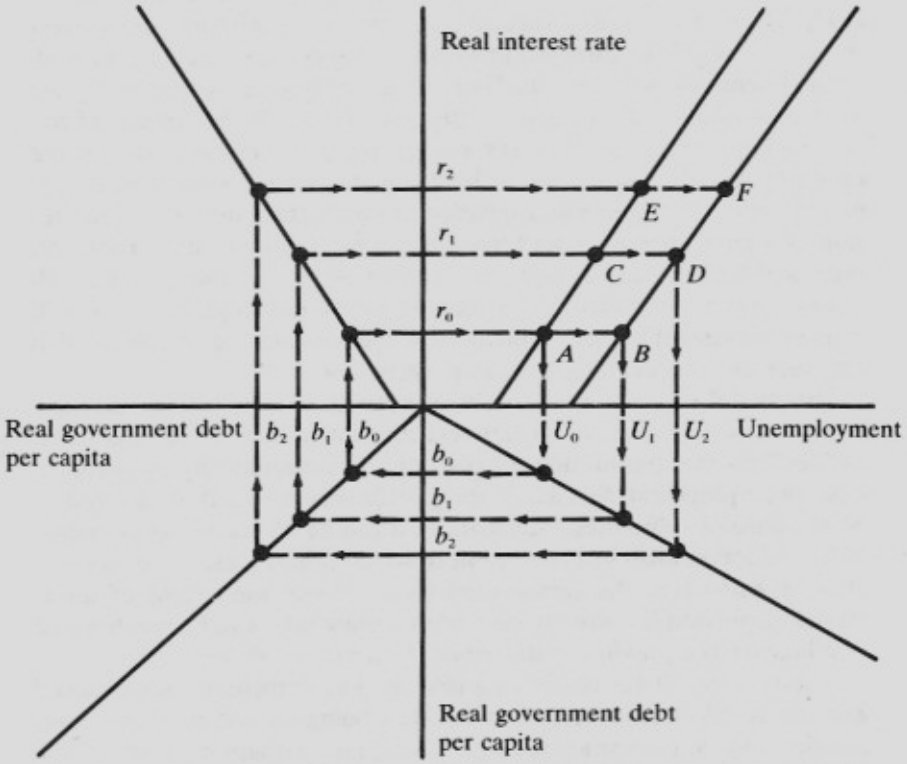

Figure 3.5. Effect of exogenous shift to unrecorded sector where monetary policy pursues price stability target and fiscal policy relies on automatic stabilizers.

equilibrium locus is also upward sloping as increased borrowing raises real interest rates. Point A displays an initial equilibrium with unemployment at U_0 and real interest rates at r_0. The borrowing b_0 required to finance outstanding government debt is consistent with the existing real rate of interest, and thus the entire economy is at an equilibrium, with monetary growth maintaining some fixed rate of inflation.

As before, we now consider the consequences of an exogenous shift to the unrecorded economy. The effect of such a shift is to produce a rightward movement in ACE to BDF since for every rate of interest, we now observe a higher level of unemployment. The higher observed unemployment level is illusionary and thus has no independent effect on the real values of the system; however, fiscal policy, which is calibrated

to observed unemployment, will automatically produce a larger deficit at U_1. The increase in government borrowing to b_1 will force the interest rate to r_1, which in turn produces a real supply side increase in both actual unemployment to point C and observed unemployment to U_2. As long as automatic stabilizers are triggered by the higher observed unemployment rates, government borrowing will increase, forcing the economy along an unstable path of higher interest rates and higher unemployment. Equilibrium inflation is unaffected, but the mere illusion of higher unemployment has created the reality of higher interest rates and higher real unemployment. Further shocks that produce additional rightward shifts in the interest rate unemployment locus will worsen the instability, as would any endogenous increase in unrecorded activities due to declining trust in government.

The model suggests that the most promising escape from the predicted worsening cycle of higher real interest rates and recession is to cut the links that permit debt increases to be automatically triggered by false unemployment signals. If the problem is correctly diagnosed as being caused by distorted information, it can be corrected by obtaining independent measures of the extent to which official data are contaminated by shifts into the unrecorded sector. Once the extent of information distortion is correctly measured, policy rules can be recalibrated to eliminate the previously described dynamic instabilities.

Alternatively, if the underlying information distortions go unnoticed and the problem is incorrectly viewed as being caused by rising debt, policies may be recommended to abandon and perhaps even to reverse conventional automatic stabilization rules. Political opposition to direct calls for greater taxation and reduced government expenditures during apparent recessions will all but eliminate this policy option. What remains is to impose arbitrary limitations on debt expansion that are unaffected by either the actual or the perceived state of the economy. The deficit reduction targets embodied in the recently enacted Gramm–Rudman–Hollings Act represent such a policy. It subverts the salutary stabilization effects of automatic stabilizers while ignoring the problem of false signals.

The fundamental problem that must be redressed is the deterioration in the information system that precipitates the predicted instabilities. Either we must find economic and political means to re-establish voluntary compliance with both the tax code and the data collection agencies of government (i.e., to restore all activity to the observed sector) or we must acknowledge the existence of the distorting information effects of the unrecorded economy and recalibrate policy instruments to properly account for the effects of the unrecorded sector.

Summary and conclusions

It is now widely acknowledged that something important occurred during the decade of the 1970's that produced a period of economic malaise and policy ineffectiveness. The stagflation issue rose to the forefront of economic and political debate among policymakers and academics. The severity of the perceived economic crisis intensified the search for explanations and remedies. New theories have been advanced and major policy changes have been undertaken. Most significant among these has been a shift from a full-employment monetary target to a price stability target. The models we have examined suggest that such a shift in policy in the face of growing unrecorded activity can alleviate the problem of stagflation at the cost of high interest rates and burgeoning deficits.

The unrecorded income hypothesis suggests that many of the questions previously posed may be wide of the mark because the problem may lie with the facts themselves rather than with the theories that seek to explain the facts. The foregoing analysis is a first step in the direction of attempting to formalize some of the intuitions that follow from posing a different set of questions. We have examined the implications of the possibility that the information system that guides policy has become distorted as a result of observer–subject–policymaker feedback. We have shown that both activist countercyclical monetary policy and fiscal policy based on traditional automatic stabilizers can produce destabilizing rather than the intended stabilizing effects whenever such policies are based on systematically faulty information. Observer–subject–policymaker feedback describes a general mechanism that could systematically distort social indicators. Empirical evidence on the growth of the unrecorded economy suggests that such a mechanism appears to have been at work during the decade of the 1970's in the United States.

Although we have only scratched the surface of exploring the full implications of this process as it affects both expectations and real economic and political behavior, we believe we have at least established a simple mechanism capable of transforming an initial statistical illusion into the reality of economic instability. We have shown, moreover, that the doctrinal arguments over monetarist policies may be deflecting our attention from a more fundamental issue that will not go away even if monetarist arguments are correct and their policies are implemented. We believe that future policy questions must contain a serious examination of the issue of the growth of the unrecorded sector and its consequences for macroeconomic stabilization. Such a discussion can take the form of normative debate on the benefits and costs of a shift toward the unrecorded sector and the design of policies to either encourage or dis-

courage the growth of the sector. Such a debate among economists will focus on issues of tax enforcement, tax reform, and optimal tax rates. Political scientists and sociologists may be more concerned with the implications of the erosion of public morality and the growth of alienation from governing institutions. The model presented here attempts to allow for both economic incentives and political and social attitudes.

What does seem clear is that regardless of one's normative perspective, there exists a positive problem for the social scientist that relates to the accurate measurement and appropriate interpretation of social indicators. A greater scientific understanding of the extent to which our current facts are distorted represents the greatest hope for the elimination of information errors that we have shown can have important destabilizing consequences. Policy illusion can be avoided either by eliminating the unrecorded sector so that the reliability of the information system is restored or by measuring correctly the magnitude of the existing distortion and recalibrating policy instruments to account for it accurately. Both approaches raise a new set of complex issues we hope will gain further attention.

What we have attempted to demonstrate is that distorted information can radically affect the stability of the economic system as it is presently constituted. When monetary policy is targeted on full employment, the outcome with distorted information is accelerating stagflation. When monetary policy is targeted on price stability while fiscal policy is geared to automatic stabilization of income, the outcome may well be higher deficits and higher interest rates. The root problem however does not seem to lie in defective theory or necessarily in defective policy prescriptions, for under both regimes we have described, policy can successfully attain stabilizing results so long as the social thermometer works accurately to produce correct information. However, a distorted information system can destabilize an otherwise stable economic system, and the predicted consequences of such distortions are broadly consistent with what we increasingly observe in our present-day economies.

APPENDIX
A MODEL TO ILLUSTRATE THE GRAPHICAL RESULTS

Model specification

The model consists of two parts. First, equations (3.1)–(3.5) in the main part of this chapter determine the division of total economic activity into its observed and unobserved parts. Equations (A.1)–(A.10)

presented in this appendix determine the total levels of output and other economic variable values. Equation (A.1) makes output Y, at time t, depend on a Cobb–Douglas production technology. Equations (A.2) and (A.3) relate gross real factor returns to the respective marginal products implied by the production function. These equations determine labor and capital demand, respectively.

Equation (A.4) makes the non-money assets that wealth holders desire to accumulate for the next period dependent upon the after-tax anticipated real return and the anticipated inflation rate. Total non-money assets A_{t+1} are shown to be comprised of real bonds b_{t+1} and real capital K_{t+1} in equation (A.10). For ease of exposition, rather than introducing a separate bond demand function and the possibility of different real rates of return on bonds and capital, we regard bonds and capital as perfect substitutes. This implies that the after-tax real return to bonds and capital is the same. Thus, bonds and capital are added together into total non-money assets. Equation (A.4) is a kind of savings function that shows how non-money asset accumulation varies with the net of tax real return and inflation rates.

Equations

$$Y_t = K_t^a N_t^{1-a} \tag{A.1}$$

$$R_t = aY_t K_t^{-1} \tag{A.2}$$

$$W_t = (1 - a)Y_t N_t^{-1} \tag{A.3}$$

$$A_{t+1} = B_0[(1 - \theta_k)\,{}_tR_{t+1}]^{\beta_1}({}_tP_{t+1}/P_t)^{\beta_2}Y_t \tag{A.4}$$

$$M_t/P_t = C_0[(1 - \theta_k)\,{}_tR_{t+1}]^{-\alpha_1}({}_tP_{t+1}/P_t)^{-\alpha_2}Y_t \tag{A.5}$$

$$N_t = N_0\exp^{nt}[(1 - \theta_L)W_t/W_f]^{\delta} \quad \text{for } (1 - \theta_L)W_t \leqslant W_F \tag{A.6}$$

$$N_t = N_0\exp^{nt} \quad \text{for } (1 - \theta_L)W_t \geqslant W_F \tag{A.7}$$

$$M_t = m(\pi D_t) \tag{A.8}$$

$$b_t = (1 - \pi)d_t \tag{A.9}$$

$$A_{t+1} = b_{t+1} + K_{t+1} \tag{A.10}$$

Model variables

t = time index
Y_t = total real output at time t
K_t = real physical capital stock at time t

N_t = employment

R_t = real rate of return before taxes on capital and bonds

W_t = real wage

P_t = price level of output in terms of money at time t

${}_tP_{t+1}$ = price level anticipated at time t for next period

A_{t+1} = real bonds and capital wealth holders wish to hold until next period

M_t = nominal money supply

b_t = real bond supply to public

D_t = accumulated nominal fiscal debt

d_t = accumulated real fiscal debt

Model parameters

n = growth rate of labor force

N_0 = initial-period labor force

θ_L = tax rate on labor income

θ_K = tax rate on asset income (i.e., bonds and capital)

W_F = real wage at which labor supply is fully employed

m = money multiplier

π = share of deficit monetized by central bank

β_1 = elasticity of non-money asset demand with respect to anticipated real after tax return

β_2 = elasticity of non-money asset demand with respect to anticipated inflation

α_1 = elasticity of money demand with respect to anticipated real after tax return on non-money assets

α_2 = elasticity of money demand with respect to anticipated inflation

δ = labor supply elasticity with respect to after-tax real wage

a = Cobb–Douglas coefficient for capital

$1 - a$ = Cobb–Douglas coefficient for labor

exp = number with natural logarithm 1

A rise in the anticipated inflation rate makes interest-bearing assets preferable to non-interest-bearing money, which suffers a negative real return that rises with the inflation rate. This substitution away from money as an asset when inflation rises is a source that Fisher (1979) calls the "Tobin effect." It provides a potential mechanism for anticipated inflation to raise real levels of output and employment by stimulating capital formation.

Equation (A.5) is a demand function for real balances that depends negatively on the anticipated real return advantage on alternative

assets, that is, bonds and capital. In addition, equations (A.4) and (A.5) make total asset accumulation vary positively with the level of real income.

Equations (A.6) and (A.7) specify the labor supply function. Labor supply is assumed to depend positively on the after-tax return to labor $(1 - \theta_L)W_t$. To capture the limits on labor supply inherent in the finite size of the labor force, a real wage rate W_F is postulated beyond which the entire labor force is willing to work. In other words, there is some wage rate at which the total supply of labor will be forthcoming. We assume in subsequent analysis that the economy operates in the region where the actual net of tax return to labor is less than W_F; that is, a rise in the wage rate will induce more labor supply. The sensitivity of labor supply to the net wage is captured in the parameter δ. If δ is zero, the labor supply is inelastic so that the entire labor supply will work at any wage rate.

Equation (A.8) is the money supply function. The monetary base πD_t is the share π of total government debt D_t monetized, that is, purchased by the central bank. This is assumed to be multiplied through the banking system's deposit creation powers by a factor of m.

Equation (A.9) shows the residual part $1 - \pi$ of the government's accumulated debt in real terms as the supply of bonds available to the public. The government deficit is either monetized by central bank open market operations or sold to the public as bonds.

To determine the model, it is necessary to specify the money growth rate and the government debt growth rate. We will refer to the setting of the money growth rate as monetary policy and the setting of the deficit as fiscal policy. The graphical analysis in the text of this chapter can be illustrated by examining the effects of the policy behavior we described there in the context of the algebraic model we have just outlined.

The Phillips curve and monetary policy

A steady-state equilibrium in the model is characterized by fixed relative prices, tax rates, and per capita real income and assets. The model is dynamic in the sense that a steady-state equilibrium can involve growing real levels of income, capital, bonds, money, and the labor force. The growth rate of the labor force determines the necessary steady-state growth rate of income and assets. If the labor force is not growing ($n = 0$), then steady-state equilibrium is at a stationary state solution where real values of all variables are fixed; but nominal values will change according to the money growth rate.

When the labor force grows, per capita real asset stocks and income

are fixed in equilibrium; but this requires real income and asset stocks to grow pari passu with the labor force. Thus, a steady-state equilibrium with labor force growth requires the real government debt to grow with the labor force. If the labor force is fixed in size, then this condition requires that the real government debt is fixed. However, the nominal government debt must grow with the money supply to provide the monetary base and to maintain portfolio balance among the public real holdings of bonds, capital, and money.

A long-term Phillips curve relating the employment rate and the steady-state inflation rate is implicit in the model. This Phillips curve is linked directly to monetary policy because the steady-state inflation rate is equal to the money growth rate minus the growth rate of real income. Short-run responses and the effect of unanticipated transient impulses in money growth could also be analyzed.

To derive the steady-state equilibrium relationship between unemployment and inflation, which is presumed to be fully anticipated in the steady state, we substitute (A.1) into (A.2) for Y_t and take the current period expectation for next period's rate of return. This yields

$$ {}_tR_{t+1} = a(K_{t+1}/N_{t+1})^{a-1} \tag{A.11} $$

Substituting (A.11) into (A.4) for ${}_tR_{t+1}$ and (A.1) into (A.4) for Y_t yields

$$ A_{t+1} = \beta_0[(1 - \theta_K)a(K_{t+1}/N_{t+1})^{a-1}]^{\beta_1}({}_tP_{t+1}/P_t)^{\beta_2}K_t^a N_t^{1-a} \tag{A.12} $$

In a steady-state equilibrium, $K_{t+1}/N_{t+1} = K_t/N_t$ and $N_{t+1} = (1 + n)N_t$.
Therefore,

$$ \frac{A_{t+1}}{N_{t+1}} = \frac{\beta_0}{1+n}\left[(1 - \theta_K)a\left(\frac{K_{t+1}}{N_{t+1}}\right)^{a-1}\right]^{\beta_1}\left(\frac{{}_tP_{t+1}}{P_t}\right)^{\beta_2}\left(\frac{K_t}{N_t}\right)^{a} \tag{A.13} $$

Taking the natural logarithm of (A.13) and solving for the equilibrium capital–labor ratio, we have

$$ \ln\frac{K}{N} = \frac{1}{(1+\beta_1)(1-a)}\{\ln\beta_0 - \ln(1+n) + \beta_1[\ln(1-\theta_K) + \ln a] + \beta_2\mu - \varepsilon\} \tag{A.14} $$

where μ is the steady-state inflation rate proxy variable, $\mu = \ln({}_tP_{t+1}/P_t)$ and $\varepsilon = \ln(1 + b/K)$. The ε term in (A.14) represents the effect of the government debt alternative to capital accumulation as a form of saving. Other things being equal, a larger real government debt outstanding implies a lower level of per capita capital accumulation.

The employment rate is given by re-writing (A.6) as

$$E_t = \frac{N_t}{N_o \exp^{nt}} = \left(\frac{(1 - a)(K_t/N_t)^a (1 - \theta_L)}{W_F} \right)^{\delta} \qquad \text{(A.15)}$$

where we have substituted (A.1) for (Y) in (A.3) and used the resulting expression for (A.3) in (A.6) for W_t to get (A.15). To express employment as a rate, we have divided (A.6) by the size of the labor force.

Taking the logarithm of (A.15), we obtain

$$e = \delta[\ln(1 - a) + \ln(1 - \theta_L) - \ln W_F] + \delta a \ln \frac{K}{N} \qquad \text{(A.16)}$$

where e is the logarithm of the steady-state employment rate.

Using (A.14) in (A.16) for $\ln K/N$, we have the long-run Phillips relation (A.17) between inflation μ and the employment rate e:

$$e = \delta[\ln(1 - a) + \ln(1 - \theta_L) - \ln W_F] + \frac{\delta a}{(1 + \beta_1)(1 - a)}[\ln \beta_0 - \ln(1 + n) + \beta_1[\ln(1 - \theta_K) + \ln a] + \beta_2 \mu - \varepsilon] \qquad \text{(A.17)}$$

The derivative of (A.17) with respect to μ, the steady-state inflation rate, is

$$\frac{de}{d\mu} = -\left[\frac{\delta}{1 - \theta_L} \frac{d\theta_L}{d\mu} + \frac{\delta a \beta_1}{(1 - \theta_K)(1 - a)(1 + \beta_1)} \frac{d\theta_K}{d\mu} \right] + \frac{\delta a \beta_2}{(1 + \beta_1)(1 - a)} - \frac{\delta a}{(1 + \beta_1)(1 - a)} \frac{d\varepsilon}{d\mu} \qquad \text{(A.18)}$$

Equation (A.18) gives the model formula for the slope of the Phillips curve.

If $de/d\mu > 0$, then a higher inflation rate results in a higher employment (lower unemployment) rate. This is the case of the traditional Phillips curve trade-off between inflation and unemployment. If $de/d\mu < 0$, then a higher inflation rate results in a lower employment (higher unemployment) rate. This is the case of steady-state stagflation. Finally, if $de/d\mu = 0$, the natural rate of unemployment hypothesis is verified, that is, the long-run Phillips curve is vertical.

Figure 3.2 assumes the vertical Phillips curve. Figure 3.3 assumes the stagflation Phillips curve. We did not treat the traditional Phillips curve possibility. Which curve is the appropriate curve depends on the sign of (A.18). The sign of (A.18) depends on two effects.

First there is the effect of inflation that can raise real tax rates in an inadequately indexed tax system. Higher tax rates will reduce the labor and capital stocks if the respective supply elasticities δ and β_1 are

positive. This reduces employment for two reasons: (1) Less labor is forthcoming at lower real after-tax wage rates and (2) less labor is demanded at any given wage rate when capital is reduced by higher tax rates because the marginal product of labor is reduced. These effects are embodied in the first term of equation (A.18).

The second term of (A.18) is the positive Tobin effect of inflation on capital accumulation. This occurs because higher inflation makes cash balances less attractive relative to physical capital as an asset form for wealth holders. If this effect outweighs the negative tax effects of inflation, then employment rises with inflation. If the tax effect dominates, then the employment rate falls with inflation. If the two effects just offset each other, the long-run Phillips curve becomes vertical. McGee (1982) describes the conditions under which one effect will dominate the other.

The final term of equation (A.18) affects the magnitude but not the sign of the Phillips curve slope. This follows because

$$\frac{d\varepsilon}{d\mu} = \frac{d}{d\mu}\ln\frac{1+b}{K} = \frac{1}{1+b/K}\frac{1}{K^2}\left(K\frac{db}{d\mu} - b\frac{dK}{d\mu}\right)$$

Since our implicit fiscal policy assumption implies $db/d\mu = 0$, the sign of $d\varepsilon/d\mu$ depends on the sign of $dK/d\mu$, which is positive if the Tobin effect dominates and negative if the tax effects of inflation dominate.

For example, if the tax effect dominates, capital declines with inflation, and the ratio b/K rises. Government debt becomes a higher proportion of asset holdings. Since the decline in K is associated with a decline in Y, total asset holdings will be reduced. If ε stayed fixed, this would require an equal fall in b and K. Since b is fixed by fiscal policy, a greater fall in K is necessary to balance asset demands. In essence, this is a crowding-out effect. The employment loss from higher inflation is greater when government debt does not decline in line with the economy.

On the other hand, if the Tobin effect dominates, K will rise with inflation. In this case, the growth of asset demand with income requires a larger increase in K than would be necessary if government debt grew in line with the income level. There will be more employment in this case than would occur if b/K stayed the same. In summary, the third term of (A.18) reinforces the more dominant of the two basic effects of inflation in our model. In the case of a vertical Phillips curve this effect is neutralized.

These observations apply to the underlying actual Phillips curve for an economy characterized by our model specification. If there is an unobserved economic sector, then we might observe something quite

different from the actual Phillips curve. We can combine the actual Phillips curve of equation (A.17) together with the composition of economic activity as it is divided between the observed and unobserved sectors to obtain the observed Phillips curve implied by equations (3.1)–(3.5) and (A.1)–(A.10).

The observed Phillips curve will differ depending on the size of the unobserved sector and how the unobserved sector reacts to inflation-induced tax increases. The observed steady-state employment rate is $E^o = \gamma E$. Taking logarithms yields

$$e^o = e + ln\gamma \tag{A.19}$$

where e is the logarithm of the actual employment rate, e^o is the logarithm of the observed employment rate, and γ is the equilibrium proportion of actual economic activity, which is observed.

Equation (3.5) determines γ as a function of individual preferences and the tax rate. For simplicity, we assume the tax rates θ on labor and capital are equal. Using (3.5) in (A.19) for γ, we have

$$e^o = e + \ln\lambda + \ln(1 - \theta) - \ln(1 - \lambda\theta) \tag{A.20}$$

Given an actual employment rate, the observed employment rate will rise with the preference for observed sector output and fall with the tax rate.

The slope of the observed Phillips curve is

$$\frac{de^o}{d\mu} = \frac{de}{d\mu} - \frac{1 - \lambda}{(1 - \theta)(1 - \lambda\theta)}\frac{d\theta}{d\mu} \tag{A.21}$$

If tax rates rise with inflation ($d\theta/d\mu > 0$), the slope of the observed Phillips curve will be less than the slope of the actual Phillips curve. Thus, if the actual Phillips curve is upward sloping, it will appear to be worse when there is an unobserved sector. If the real Phillips curve is vertical, we may still observe an upward sloping Phillips curve because, despite the vertical slope of the real curve, equation (A.21) shows the observed curve can have a positive slope due to the induced effect of higher tax rates on the unobserved sector. It is even possible that the actual Phillips curve could be like the traditional curve, but the shrinkage of the observed economy as taxes rise creates the illusion of a stagflationary curve.

If the unobserved sector is exogenous with respect to tax rates, then (A.21) reduces to

$$\frac{de^o}{d\mu} = \frac{de}{d\mu}$$

and the unobserved sector just causes a parallel shift difference between the actual and observed Phillips curve.

Figures 3.2 and 3.3 assume such an exogenous unobserved sector, and $de/d\mu = 0$ and $de/d\mu < 0$, respectively. Figure 3.4 assumes $de/d\mu < 0$ and an endogenous component to the slope of the Phillips curve due to the endogenous response of the unobserved sector to inflation-induced tax rises.

The inflation–employment relation is based on the effect of monetary policy taking fiscal policy as a given. We turn next to the effects of fiscal policy in the model when we take monetary policy as given.

Fiscal policy and the unobserved economy

When monetary policy is fixed on an inflation rate target, the effect of an exogenous increase in the unobserved sector will be to create a gap between government spending and tax revenues. This deficit will necessitate an increase in the bond supply to the public in order to finance the loss of tax revenues to the unobserved sector. To the extent that this creates a crowding-out effect and raises interest rates, there will be a reduction in the equilibrium level of capital that will reduce the demand for labor and increase the unemployment rate. If government spending increases to compensate the unemployed, there will be an additional increase in the deficit that will add to the overall tightness in the credit markets.

Suppose therefore that government spending consists of exogenous expenditure $\bar{G}$, unemployment compensation at the rate ϕ of wages, and interest on the government debt. Then total government spending is given by

$$G_t = \bar{G} + \phi W_T(N_L - N_t) + R_t b_t$$

where N_L is the total labor force and $N_L - N_t$ is the unemployed labor supply.

Total tax revenues (without an unobserved sector) are given by

$$T_t = \theta Y_t$$

Steady-state equilibrium in the model requires that the government budget be balanced in a stationary state with a fixed labor force: Or in the case of a growing labor force, the amount of real outstanding government debt can grow pari passu with the labor force. For simplicity, we will treat the stationary state case to illustrate the effect of the unobserved economy on the unemployment rate.

Suppose the economy is initially in an equilibrium with a balanced

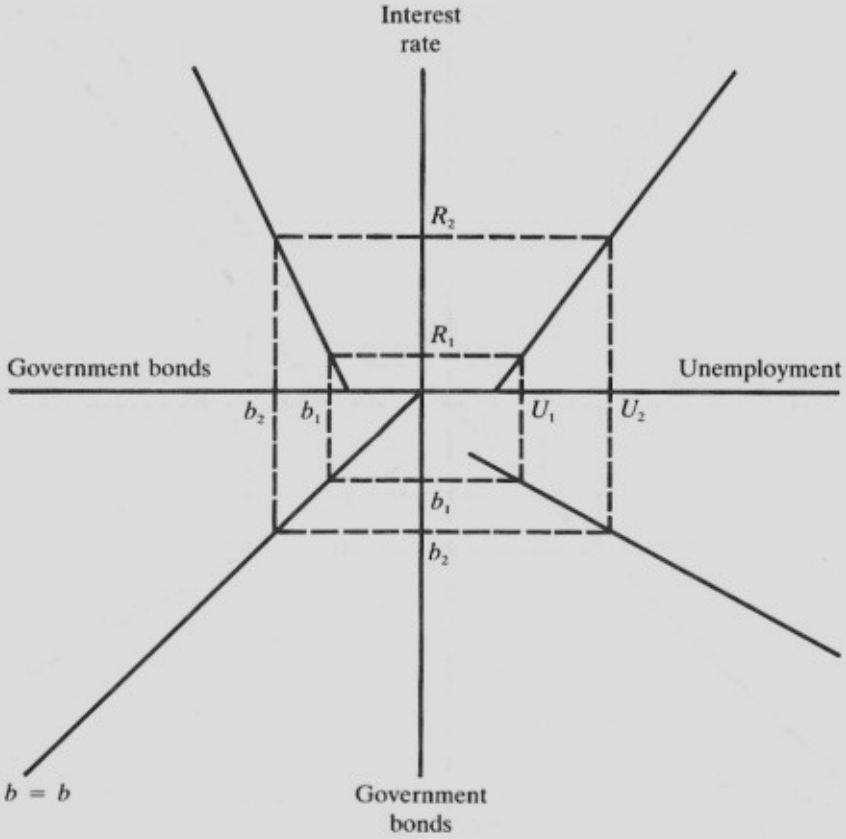

Figure 3.6. Equilibrium relations between government debt, interest rate, and unemployment.

budget and outstanding government debt b_1. Assume monetary policy is targeted on zero inflation, which in conjunction with the zero labor force growth rate implies the money supply is fixed. The equilibrium government budget constraint is then

$$G - T = 0 \quad \text{or} \quad \bar{G} + \phi W_1(N_L - N_1) + R_1 b_1 = \theta Y_1$$

Figure 3.6 illustrates such a stationary state equilibrium. Given this publicly held stock of government debt, there is an interest rate R_1 determined in the asset market. This corresponds to a particular level of the capital stock that together with the other relations in the model determines an unemployment rate U_1. The relations in Figure 3.6 are

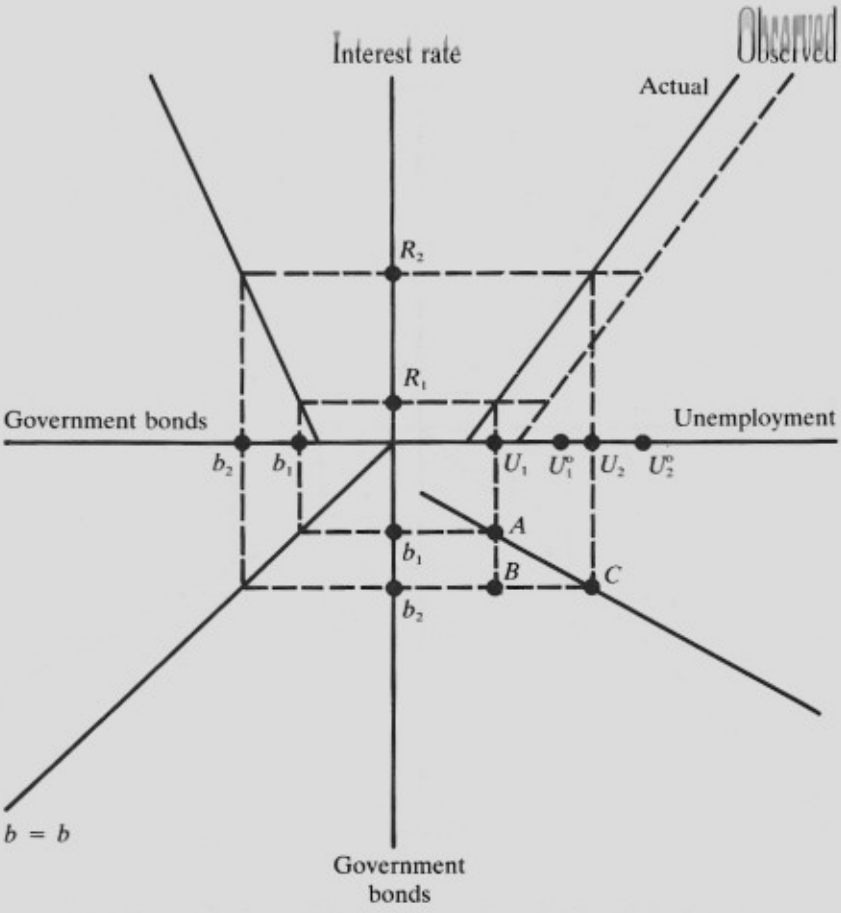

Figure 3.7. Effect of exogenous shift to unrecorded sector where monetary policy pursues price stability and fiscal policy includes automatic stabilizers.

drawn to illustrate the fact that increasingly high levels of government debt that are not monetized will raise the real interest rate and the unemployment level. For example, if the government's debt is b_2 instead of b_1, both the real interest rate and the unemployment rate will be higher at R_2 and U_2, respectively.

Figure 3.7 introduces the unobserved economy. The unobserved economy creates a discrepancy between the actual and the observed unemployment rate at each interest rate. This will disturb the government's budget constraint given monetary policy and exogenous government spending. We now have

$$G - T > 0 \quad \text{or} \quad G + \phi W_1(N_L - N_1) + R_1 b_1 > \theta Y_1$$

We assume taxes are only paid on observed income, and unemployment compensation is based on observed unemployment. Since $Y_1^o < Y_1$ and $U_1^o > U_1$, the right side of the budget constraint is reduced and the left side is increased, implying a fiscal deficit.

This fiscal deficit, which will not be financed by money expansion in our example, raises the stock of government debt held by the public to b_2.

Figure 3.7 shows that the deficit $b_2 - b_1$, which moves the bond supply from point A to point B, creates a disequilibrium in the asset market, which requires a rise in the interest rate to R_2 as more savings are accumulated as bonds and less are left for capital. This reduces income and employment.

A new equilibrium can be established at points R_2, b_2, U_2 if exogenous government expenditure $\bar{G}$ is reduced sufficiently to balance the budget at C. Observed unemployment would then be U_2^o. The unobserved sector would then have raised both interest rates and unemployment because of its effect on the government's accumulated debt.

If government expenditures are not reduced sufficiently to balance the budget at C, then the supply of bonds will continue to increase, further raising the interest rate and unemployment. This possibility results in the kind of deteriorating spiral depicted in Figure 3.4.

The effect of the deficit induced by the unobserved economy on the employment rate can be obtained by differentiating equation (A.17) with respect to the bond supply:

$$\frac{de}{db} = \frac{-\delta a}{(1-a)(1+\beta_1)} \frac{d\varepsilon}{db} < 0 \quad \text{since} \quad \frac{d\varepsilon}{db} = \frac{1}{K+b}[1 - n_{Kb}] > 0$$

where n_{Kb} is the elasticity of the capital stock with respect to the government bond supply, which is negative. Since the employment rate falls as the government's debt rises, the unemployment rate must rise.