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Efficiency of the Natural Rate

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During the sixties a cornerstone of economic policy was that permanent inflation results in high levels of economic activity. This was based in large part on the observation that prices and output, when measured as deviations from trend, are highly correlated—that is, the Phillips curve. Phelps and others showed that this apparent trade-off could not be explained in modern theoretical terms except possibly as a monetary and transient phenomenon. Inevitably, such an analysis implied a natural rate of unemployment or employment. The path-breaking book, *The New Microeconomics in Employment Theory* (New York: W. W. Norton & Co., 1970), by Edmund S. Phelps et al., contains most of these studies. In the first part of the book under review (Edmund S. Phelps, *Inflation Policy and Unemployment Theory: The Cost Benefit Approach to Monetary Planning* [London: Macmillan Co., 1972]), these and related developments in unemployment theory are synthesized and presented in a lucid and elegant manner. I recommend this book to all economists interested in understanding the new theory.

Within the framework of modern unemployment theory, each of the three basic definitions employed treats unemployment as a private investment: (1) Search unemployment is a sacrifice of present wage earnings in return for the expectations of an improvement in future earnings. (2) Precautionary unemployment is an act of waiting in order to be available for better use later. (3) In the neoclassical speculative labor supply model, unemployment is an intended intertemporal trade of present leisure for an expected improvement in leisure cost of future consumption and future leisure. To this list I would add layoff unemploy-

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ment, which Azariadis (1973) recently rationalized within the framework of a competitive equilibrium using an implicit contract construct.

The implication of the theory is that market economies have a natural or equilibrium rate of unemployment and that unemployment cannot be maintained below this level. If, in addition, expectations are treated in a conventional way, namely, as a state variable which changes in response to changing economic conditions, the theory implies that the unemployment rate can temporarily be maintained below the natural rate. If current expectations of inflation are 3 percent, for example, and an aggregate demand policy that increases the inflation rate is pursued, expectations of inflation will lag behind actual increases and there will be a period of unemployment below the natural rate.

Phelps examines the efficiency of the natural rate of unemployment and argues that it is excessive. He also argues that there are desirable distributional consequences of unanticipated inflation and uses optimal taxation theory to conclude that the optimal rate of anticipated inflation is positive. His policy prescription is "that if the current expected rate is less than the optimum, reduction of unemployment below the equilibrium is indicated by the optimal inflation policy; the dark side is that in the contrary event, an episode of above equilibrium unemployment is indicated" (pp. xxvi-xxvii). He does not specifically state what he considers to be the optimal rate, but by inference it is in excess of 5 percent.

In this essay I present arguments, also based on economic theory, that the natural rate of unemployment is approximately optimal and that deviations from optimality might even be in the negative direction. Furthermore, there are real costs associated with unanticipated inflation and below-average unemployment. The second part of this essay argues that it is not feasible even temporarily to reduce unemployment in an expected-value sense by "trading on the opacity of the monetary and fiscal veils." The final part questions whether optimal control theory and sophisticated second-best cost-benefit analysis are the appropriate framework for evaluating unemployment and inflation policies.

Costs and Benefits

In chapter 4, Phelps examines the benefits and costs of a departure of the employment rate from the equilibrium or natural level. Astonishingly, this appears to be the first systematic inquiry into this question. I compliment the author for phrasing the question in terms of the efficient level of employment rather than unemployment. This is appropriate because of the inherent arbitrariness of any definition of unemployment. It is well known that increases in employment are not offset by equal reductions in the measured unemployment rate. Some so-called discouraged workers reenter the labor force. According to the Bureau of

Labor Statistics definition of unemployment, a person is unemployed if he perceives the probability to be sufficiently high that a state prevails in which he would choose to be employed and that within the last three weeks he made some minimal effort to determine whether such a state did indeed prevail. (A minimal effort would be asking a friend about employment prospects or looking in the help-wanted ads.) I have no better definition to propose and can only recommend that we focus on employment.

Of Phelps's arguments that equilibrium employment is less than optimal, the one that is probably quantitatively most important concerns the distortion introduced by taxes. Taxes cause people to oversubstitute leisure for market-produced goods and services. If there is a representative individual with a time-separable utility function, the net gain from increasing employment by a given small amount is the product of the marginal product of labor, the tax rate, and the increase in labor utilized. This of course assumes, among other things, that the additional tax revenue will not be expropriated by the bureaucracy. If, on the other hand, Niskanen (1971) is correct and the bureaucracy extracts the full surplus, there are no gains. Truth surely lies somewhere in between these two extremes, but even if we make the most liberal assumption, the gains are not large. Assuming that the average product and marginal product of labor are equal and the marginal tax rate is one-third, the social gain from a 1 percent increase in employment will be approximately equal to one-quarter of 1 percent of the GNP. This seems like a small gain compared with the losses associated with wage and price controls and other misguided and costly measures designed to hold the price level down.

If utility functions are not time separable and preferences for leisure are greater the less leisure has been consumed in the recent past, the social gain from tricking people into supplying above-equilibrium employment will be even smaller. There are a number of reasons to believe this is indeed the case. We all enjoy a vacation more the longer it has been since our last one and the greater the intensity of our recent work effort. Workers initially welcome overtime, but after extended periods of long hours they are happy when normal schedules return. Frequently, secondary wage earners voluntarily terminate employment after working several months, only to reenter the labor force a year or so later. These observations and others suggest a capital theoretic element to labor supply. Above-equilibrium employment is in a sense analogous to the depletion of the capital stock, given that future labor supply and consequently output are reduced.

Since this book was written, there have been at least three analyses of the efficiency of various types of unemployment within an equilibrium framework. In the absence of an income tax or other distortion, Lucas (1972) analyzed the efficiency of the natural rate within a rational

expectations equilibrium model of the business cycle and found it to be optimal in an appropriate sense. Thus, speculative theories of unemployment do not necessarily imply excessive unemployment. Similarly, for layoff unemployment and a version of search unemployment, Azariadis (1973) and Mortensen (1974) found that the natural rates were efficient.

Phelps's contentions and arguments concerning the likely inefficiency of search unemployment motivated me to perform a rigorous analysis within the framework of Lucas's and my (1974) equilibrium search structure. I found that the natural rate of unemployment was again optimal. An outline of the argument is as follows. The state of the economy at a point in time is characterized by the distribution of the workers over markets. Given that the assumed objective of the worker is to maximize the present value of wages, the appropriate social objective function is discounted consumer surplus. The implication of the straightforward dynamic-programming exercise is that there is a decision rule which specifies the optimal distribution of workers over markets for the next period as a function of the current distribution. The equilibrium Lucas and I analyze is just the rest point for this discounted optimal-growth-type problem. Thus, if the economy is in equilibrium it is socially optimal that it stay there. An unanticipated increase in aggregate demand will increase employment and output in the current period, but necessarily, the cost of such an increase will be more than offset by a decrease in the present value of future surplus. For this idealized structure the "dirt must be eaten" sometime.

Distortions could be introduced into the structure making the natural rate inefficient. For example, unemployment insurance would drive a wedge between the private and social cost of search, making the search unemployment excessive. In practice, most of the insured unemployed have been laid off and are not searching for new jobs. If one quits to search for a new job, he is not immediately eligible for unemployment benefits. Risk aversion on the part of workers along with imperfect capital markets would tend to reduce the natural rate, but I doubt whether this effect is quantitatively significant.

Phelps argues that precautionary unemployment is likely to be excessive for the following reason. Sellers of labor services who face a randomly fluctuating demand for their services have some monopoly power. They can increase the frequency of employment by lowering their price. Consequently, the marginal revenue resulting from additional employment is less than the wage, and unemployment is excessive.

This result is not always true when considered within a market framework, as demonstrated by the following example. Suppose there is a stochastic demand n for hotel rooms, the distribution function being $F(n)$. All demanders are identical and purchase one unit if the price is below \bar{p} and no units otherwise. The equilibrium structure of such a

market is to have a distribution of prices rather than a single price, even though the product is homogeneous. Let $H(p)$ be the equilibrium number of rooms priced at p or below. I assume owners of rooms set their price and cannot change it after the realization of demand. Further, I assume that a less expensive unit will be rented before a more expensive one.

In equilibrium a unit is vacant with probability $F[H(p)]$. Letting c be the cost of providing one unit, free entry implies zero expected profit or

$$\{1 - F[H(p)]\}p = c$$

in the range $c \leq p \leq \bar{p}$. The relationship can be solved for the equilibrium distribution of rooms, namely,

$$H(p) = F^{-1}(1 - c/p),$$

where F^{-1} is the inverse function for F .

The question arises as to whether this stock of rooms is socially optimal. Here the social objective function is unambiguous. Each person occupying a room values it at \bar{p} , and each room costs c . The social objective function for stock of houses H is therefore

$$\bar{p} \int_0^H n dF(n) - H\bar{p} \int_H^\infty dF(n) - cH.$$

This function is maximized when the cost of providing one additional unit is just matched by the product of \bar{p} and the probability that this unit will be occupied given that it is the last one rented.

For this example, which entails monopoly power on the part of sellers facing a stochastic demand, the competitive equilibrium is efficient. If demanders were heterogeneous (in terms of preferences) and there were heterogeneity in the type of rooms supplied, it is possible that these conclusions would be altered. Until such an analysis is successfully performed, I see no reason to conjecture that the natural vacancy rate is either too high or too low.

The next issue is whether there are significant congestion-like externalities associated with search and precautionary unemployment and, if there are, what effect if any they have on the natural rate. Phelps argues that job rationing and congestion phenomena will drive a wedge between the private contribution of unemployment to future earnings and its social contribution to future productivity. His analogy with a stochastic stream of arrivals at the site of a great falls (pp. 103-5) does lend credence to his contentions, but a rigorous defense is needed before it can be the basis for policy.

One cannot disagree on economic grounds with his contention that the optimal inflation tax is not zero. It is a tax collected on currency and that part of demand deposits backed by reserves—which is not most of the American money supply. Unless reserve requirements were increased,

such a tax would result in resources being wasted in excessive banking. If reserve requirements were increased and double-digit inflation rates persisted for an extended period, I predict that new forms of private money that avoided the tax would develop.

Barro (1972) estimated that the marginal collection costs of this inflation tax are in excess of 50 percent for all positive anticipated inflation rates. If one accepts these results, and I see no reason not to, the optimal inflation tax is negative. Surely the marginal collection costs from other sources are not that large. As a side issue, an inflation tax is of questionable legality. The American Constitution specifies that taxes are to be imposed only when approved by our elective representatives. Before such a tax is imposed I would like to see our congressmen stand up and vote for whatever happens to be the optimal inflation tax.

Throughout the book, Phelps's concern is almost exclusively with monetary theories of the business cycle where the crucial element is trickery. People observe prices and cannot distinguish perfectly between real and nominal changes. Some fluctuations in employment and output are the result of real factors. Suppose, for example, that periodically and predictably a government squanders society's scarce resources on some socially unproductive activity. These expenditures are financed by issuing debt which is retired during periods in which the government behaves more responsibly. Tax rates do not vary.

During periods in which the government squanders resources, real wages will be high temporarily and, as a result, so too will both employment and output. Provided the government's expenditures are not too large, it is even possible that consumption will move procyclically. During such periods, when the government is building a pyramid, for example, workers are happy. They like above-average real wages. Furthermore, some of those with low marginal products, namely, the poor, will enter the labor force, and the measured distribution of income will be more equitable. The naive economist might well argue for more pyramid building.

This transparent example illustrates some of the dangers of drawing inferences concerning distributional effects by observing cyclical patterns. Clearly, it is in no one's interest to squander society's scarce resources, and the welfare of everyone is greater the lower the frequency of such irresponsible governmental behavior.

Is an Unanticipated Policy Feasible?

The conventional view, which is implicit or explicit in most of current macroeconomic analysis, is that expectations are a state variable which move in response to economic events; that is, the expected inflation rate depends in some ad hoc mechanical way on past rates. Are agents so

stupid as to form their expectations in this way? There is overwhelming evidence, at least in capital markets, that markets are efficient; that is, agents use available information in an optimal manner.¹ Agents have access to the same economic experts as do the policymakers. These experts are very sophisticated in forecasting future policy actions, and it is only reasonable to assume that their forecasts are unbiased. This is not to say that policymakers' actions are totally predictable but that predictions tend to be below realizations as often as they are above. If I am correct in my contention that economic experts forecast policy in an unbiased way, a policy of unanticipated inflation is not feasible.

This contention is not inconsistent with the ability of policymakers to engineer booms or recessions using monetary and fiscal tools; rather, such fluctuations are the result of anticipated factors, as is true for the anticipated fiscal cycle policy discussed previously. These fluctuations are not the result of deception or the opacity of the monetary and fiscal veils.

Is Optimal Control Theory Appropriate?

Phelps proposes that the stream of discounted social costs and benefits associated with each feasible policy be compared, *given the current economic situation*, relative to an agreed preference (π). This optimal-control-theory approach may seem reasonable, but it ignores the capital theoretic element of government credibility and the value of being able to commit future policymakers.

This is particularly clear for the capital-deficient underdeveloped country. If foreign investors are confident that an underdeveloped country will not default on its loans, that country's cost of borrowing will be low. If, on the other hand, foreign investors expect the country to default as soon as the present value of the benefits from having access to world capital markets is less than the present value of the costs of servicing existing debts, the equilibrium interest rate will be high. This is just the rationalization for legally enforceable contracts. Isn't there an *economic* justification for the government to honor its commitments, such as providing reasonable price stability, similar to that which moves private individuals and corporations to honor theirs?

Costs of Inflation

Our current institutional arrangements are predicated on reasonable price stability and result in inefficiencies during inflationary, and also deflationary, times. Institutional arrangements can and do change in response to

¹ See, e.g., Fama (1970). This is also consistent with Samuelson's (1974) contention that economists cannot forecast price movements.

environmental changes. But they change slowly, and during the transition society's scarce resources are wasted. Look at the housing market now. The current high interest rates reflect expectations of future inflation; yet mortgage contracts still require a constant monthly payment over the life of the loan. Insofar as expectations are realized, potential home purchasers are either forced to oversave or not to buy a house. If high rates of inflation persist, I am sure that mortgage payments will be indexed, but until then, there will be real costs associated with inflation.

Summary

Phelps has brilliantly synthesized the new theory of unemployment. He has opened a debate within the framework of modern economic theory about the costs and benefits of anticipated and unanticipated inflation. In this review I have entered into this debate and hope others, after reading the book, will do likewise.

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