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Edmund Phelps and Modern Macroeconomics

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ABSTRACT *Edmund Phelps, winner of the 2006 Nobel Prize in Economics, has been a central figure in the development of macroeconomics since his 1961 article 'The Golden Rule of Accumulation' on optimal economic growth. His 1967–68 critique of the stability of the Phillips curve trade-off, together with Friedman (1968), led to the expectations-augmented Phillips curve and the natural rate hypothesis. His work on the choice-theoretic microeconomic foundations of wage, price, and employment dynamics under imperfect information, changed how economists do macroeconomics. Phelps subsequently developed natural rate models in a non-monetary, structuralist direction distinct from Friedman's monetarism and from New Classical economics, analyzing the natural rate of unemployment as a function of the real structure of the economy: real sectoral demands, factor supplies, technology, taxes, subsidies, tariffs, and real interest and exchange rates.*

On October 9, 2006, Edmund S. (Ned) Phelps, McVickar Professor of Political Economy at Columbia University, was awarded the Royal Bank of Sweden (Sveriges Riksbank) Prize in Economic Science in Memory of Alfred Nobel. Announcing the prize, the Swedish Academy of Sciences emphasized that 'Mr. Phelps showed how the possibilities of stabilization policy in the future depend on today's policy decisions: Low inflation today leads to expectations of low inflation also in the future, thereby facilitating future policy.' The Academy's announcement focuses on the introduction of the natural rate hypothesis and the expectations-augmented Phillips curve by Phelps (1967) and by Milton Friedman (1968), who was the Nobel laureate in economics 30 years before Phelps.

Phelps and Friedman extended the Phillip curve trade-off between inflation and unemployment by postulating that the rate of change of money wages depends on the expected rate of inflation (just as nominal interest depends on expected inflation in the Fisher equation of Fisher, 1896). They argued that expected inflation is endogenous, responding adaptively to errors in expectations so that expected inflation is a distributed lag of past inflation rates (cf. Fisher, 1926/1973, in which Irving Fisher correlated US unemployment with a distributed

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lag of price level changes). Expansionary monetary policy could not produce a lasting reduction in unemployment at the cost of increasing inflation, because the higher inflation would come to be expected, and the rate of unemployment would gravitate back towards its natural rate (the non-accelerating inflation rate of unemployment, or NAIRU). The Phillips curve is thus not a menu for policy choice: any attempt to deliberately move along it will change expectations of inflation, and cause the trade-off to shift. (A.W.H. Phillips did not think that the interesting historical correlation he had found in British data offered a menu for policy choice, and may even have suggested to Friedman that adaptive expectations would be useful in analyzing the inflation-unemployment trade-off – see Leeson, 2000).

Friedman's (1968) presidential address to the American Economic Association, was widely influential,[1] especially among policy-makers, even though Phelps (1967) appeared in print first (Friedman, 1966, had previously, in a comment in a conference volume, denied any stable relationship between unemployment and different rates of steady inflation). However, working economists, looking for more formal and technical analysis, were led into the microeconomic foundations of employment, unemployment, inflation, and money wage dynamics by Phelps (1967, 1968, 1969, 1972a, 1979) and above all by 'the Phelps volume' (Phelps *et al.*, 1970). This body of work reoriented the methodology of modern macroeconomics, focusing attention on the choice-theoretic underpinnings of aggregate variables, particularly with regard to how labor markets work. New Classical economists such as Robert Lucas (1981) introduced the hypothesis of rational expectations (agents make no systematic errors in their predictions), an approach that Phelps evaluated sympathetically but by no means uncritically (Frydman & Phelps, 1983). But the New Classical economists were not responsible for the modern emphasis on the choice-theoretic microeconomic foundations of the macroeconomic analysis of employment, inflation, and fluctuations. That had already been achieved by Phelps and his associates in a series of path-breaking publications from 1967 to 1972. As Axel Leijonhufvud remarked, 'A case can be made that modern macroeconomics stems more from the natural rate doctrine than from rational expectations' (Leijonhufvud, 2004, p. 811).

But there is much more to Phelps's contribution to economics than just that one great breakthrough associated with the natural rate hypothesis, the expectations-augmented Phillips curve, and choice-theoretic microeconomics foundations. The 'islands model' of imperfectly communicating markets was introduced by Phelps (1969), and hysteresis by Phelps (1972a). While Lucas (1981) looked at how monetary misperceptions cause fluctuations around the natural rate (Lucas, together with Leonard Rapping, had contributed to Phelps *et al.*, 1970), Phelps (1994) developed a structuralist macroeconomics that

[1]In a six-paper symposium on NAIRU (Stiglitz *et al.*, 1997), all six papers refer to Friedman (1968), three cite Phelps (1968), but none mention Phelps (1967). James Galbraith (in Stiglitz *et al.*, 1997, p. 93) writes of 'Milton Friedman's remarkable 1968 presidential lecture to the American Economics Association, as close as economists get to delivery from Olympus', that 'Perhaps no other presidential address has ever been so influential.'

analyzed structural booms and slumps as changes in the natural rate of unemployment (see also Fitoussi & Phelps, 1986, 1988; Phelps & Zoega, 1997, 1998, 2001; Hoon & Phelps, 1992, 1997, 2007; Hoon *et al.*, 2005).

Phelps also stands out from other macroeconomic theorists in having a serious, longstanding, scholarly and personal concern with economic justice (see Phelps, 1973b, 1975). This concern motivated the second body of research cited by the Swedish Academy of Sciences, Phelps's analysis of the trade-off between consumption by current generations and consumption by future generations, starting with his early work on 'golden rules' of capital accumulation and economic growth (Phelps, 1961b, 1965c, 1966a, 1966b; see also Phelps & Shell, 1969). This concern with the justice and morality of economic processes motivated his influential study of statistical theory of racial and gender discrimination in labor markets (Phelps, 1972a, 1972b). It also motivates what may well turn out to rank among his most important contributions, his books on *Rewarding Work: How to Restore Participation and Self-Support to Free Enterprise* (Phelps, 1997), *Enterprise and Inclusion in Italy* (Phelps, 2002a), and *Designing Inclusion: Tools to Raise Low-End Pay and Employment in Private Enterprise* (Phelps, 2003b). Stimulated by spending 1969–70 at Stanford's Center for Advanced Study in the Behavioral Sciences while John Rawls (1971) was there finishing *A Theory of Justice*, Phelps (1987, 1995a, pp. 98–99) gave serious attention to what would constitute justice in society's design of the reward structure motivating production and exchange. As director since 2001 of the Center on Capitalism and Society at Columbia University's Earth Institute, Phelps is highly unusual among the elite of top-level theorists capable of publishing in the inaugural volume of *Journal of Economic Theory* (Phelps & Shell, 1969) in choosing to devote his talents and energy to bringing economic theory to bear on how to make capitalism inclusive and rewarding for all, not just the fortunate.

Phelps (2007, pp. 554–558) devoted the concluding section of his Nobel Lecture to consideration of what constitutes 'The Good Economy: Innovative and Inclusive', a serious philosophical inquiry beyond what might typically be expected of a macroeconomic theorist. He proposes, citing precedents from Aristotle to John Rawls's concept of self-realization, that the essence of the good life is a career of challenge and personal development, which need not be correlated with reported happiness: 'a morally acceptable economy must have enough dynamism to make work amply engaging and rewarding; and have enough justice, if dynamism alone cannot do the job, to secure ample inclusion' (Phelps, 2007, p. 558). These philosophical reflections about the nature of justice, the good life, and the good economy that promotes the good life have a direct, practical significance for economics: Phelps sees 'a debate in the making between, on the one hand, those *neoclassicals* who would put the emphasis on *pushing* more resources into the economy (more technology or more human capital) as a way of raising output and employment; and, on the other hand, those *modernizers* who favor a strategy of *pulling* existing resources into innovative activity and general business activity through reforms of labor law, company law, and the financial sector' (Phelps, 2007, pp. 557–558).

1. Beginnings

Edmund Phelps was born in Evanston, Illinois, on July 26, 1933, to parents who lost their jobs in the Great Depression (Henderson, 2006). He graduated from Amherst College in Massachusetts in 1955. He would have majored in philosophy at Amherst, but his father cajoled him into trying an economics course in his second year: 'I was hugely impressed to see that it was possible to subject the events in those newspapers I had read about to a formal sort of analysis [but] I had a vague sense that the microeconomics taught in one set of courses was not communicating with the macroeconomics in the other courses' (Phelps, 1995a, p. 91). He did his postgraduate studies at Yale University, where he was influenced by macroeconomists James Tobin, William Fellner, Henry Wallich, and Arthur Okun (all at some point members of the President's Council of Economic Advisers), and, among microeconomists, Thomas Schelling (like Tobin, a future Nobel laureate). He received his PhD in economics in 1959. After working as an economist at the RAND Corporation (1959–60), Phelps returned to teach at Yale from 1960 to 1966 (with a year as a visiting associate professor at MIT, 1962–63), taking charge of the principles of economic course and editing Norton's Problems of the Modern Economy series of policy-oriented books of readings for undergraduate economics courses (e.g. Phelps, 1962b). Phelps's long-time concern with making state-of-the-art modern economics accessible to beginning undergraduates was reflected much later in his innovative *Political Economy, An Introductory Text* (Phelps, 1985), described by Michael Weinstein (1987, p. 179) as 'a modernist (his word) vision of asymmetric and imperfect information, incentive compatibilities, and a host of other problems of coordination and reward that plague real economies.' At the time Phelps was there, Yale published the *Yale Economic Essays*, a journal primarily devoted to articles based on Yale doctoral dissertations in economics. Phelps (1961a) published there, was part of the then-burgeoning empirical literature on whether US inflation in the 1950s (running at rates that seem enviably low in retrospect) was due to cost-push or demand-pull factors. Phelps's choice of topic coincided with the research interests, at that time, of one of his teachers, Fellner (1959), although Phelps (1995a) credits another of his teachers, James Tobin, with suggesting the topic. Phelps (1990a, p. 98) remarked that contemporary analysis of struggles over the mark-up 'is quite reminiscent of the formulation by William Fellner of thirty years ago.'

Phelps (1962a) contributed to the neoclassical theory of investment decisions by profit-maximizing firms, following Robert Solow (1956, 1957), Trevor Swan (1956), and James Tobin (1955) in developing a growth model with substitution between capital and labor instead of the Harrod–Domar assumption of strict complementarity between the two factors of production.[2] The novel feature of Phelps (1962a), and of a simplified exposition in Phelps (1962b), relative to the articles of Solow, Swan, and Tobin six or seven years before, was Phelps's emphasis that while investment serves to modernize as well as to increase the capital stock

[2]Phelps taught a course on capital theory with Robert Solow while visiting MIT in 1962–63.

(hence, his was an exercise in modeling vintage capital), once the economy has reached a steady state, the average age of machines would be independent of the propensity to save. In a comment, Robin Matthews showed that such independence depends on unitary elasticity of substitution between capital and labor (a Cobb–Douglas production function). Phelps first achieved recognition among economists for his work on optimal capital accumulation (Phelps, 1961b, 1965c, 1966a, 1966b) and on how tax policy affects capital accumulation (Phelps, 1965a; Phelps & Shell, 1969). 'The Golden Rule of Accumulation' holds that a constant returns to scale economy achieves its highest attainable consumption path when the profit rate is equal to the rate of accumulation of capital (the share of profits in output equal to the share of net investment in output). The golden rule, like Paul Samuelson's overlapping generations model and the Baumol–Tobin square root rule for transactions demand for money, was subsequently discerned in the mathematical appendix to Maurice Allais (1947), unknown to Anglophone economists (see also Allais, 1962), but Phelps's formulation was independent and his exploration of the issue fuller.

Certain life-long characteristics of Phelps as an economist are already evident in his early publications, beyond his remarkable technical skills (and the influence of his Yale teachers, e.g. Tobin, 1955 and Fellner, 1959). His interests lay with technically-rigorous research that was relevant to crucial issues of public policy, as in *Fiscal Neutrality toward Economic Growth* (Phelps, 1965a), his first book (apart from edited volumes). Most of all, presaging his later work on economic justice and on designing structural reforms to make capitalism more inclusive, Phelps was concerned with using theory and policy to make people better off: 'golden rules' of economic growth (Phelps, 1961b, 1965c, 1966a, 1966b) consider which growth path maximizes welfare, while Phelps (1965b) analyzed how even inflation that is correctly expected by economic agents affects economic welfare (as people engage in costly transactions to economize on holding real money balances whose purchasing power is shrinking). He did not pursue theoretical brilliance primarily for its own sake, but for the sake of understanding and, where feasible, improving the real world. (It is, of course, easier for a young assistant professor to take such an interest in the real world when his peers and elders are already aware of his technical virtuosity.) Sorting out the classes of vintage capital models in which the average age of machines in independent of the propensity to save in steady state growth is interesting as an abstract exercise in pure theorizing, but even more so in shedding light on the appropriate policy encouraging or discouraging saving to achieve the most desirable steady state growth path.

His early work won Phelps election as a Fellow of the Econometric Society in 1966. 'Yet,' recalls Phelps (1995a, p. 93),

> I came to feel that I was simply winning (or losing) footraces by a few steps. I saw that if I was to do anything of unusual depth and distinctiveness I would have to think much harder than I had generally done – to raise the level of my game. There is, as I was to appreciate better, a big difference between scanning existing models for their unnoticed implications, on the one hand, and, on the other, acquiring an independent empirical sense of how in some overlooked or misunderstood way the economy works.

Phelps's publications at Yale (1960–66) won him recognition as a rising star in the profession, but those published while he was at the University of Pennsylvania (1966–71) changed how economists do macroeconomics.

'One might have thought that this success at playing the game would be rewarded with promotion to tenure. However, Yale had squandered one tenure slot after another in those years, building up what must have been the largest Economics Department in the country, until the President was finally resistant to creating yet another' (Phelps, 1995a, p. 93). Mark Blaug and Gerard Debreu were among other young economists of distinction who had left Yale earlier in the 1960s when it was made clear that there would be no tenure for them. Northwestern and Pennsylvania offered Phelps full professorships. As Phelps (1995a, p. 93) himself put it, his departure from Yale to Penn in January 1966 'marked a kind of passage into my years of high creativity, which were nearly continuous for a decade.'

2. The Natural Rate Hypothesis and the Phelps Volume

In his March 1969 preface to 'the Phelps volume' (Phelps *et al.*, 1970, p. vii), Phelps wrote that, 'Last year several of us were excited to learn that we were not alone. Similar life existed on other campuses. Evidence was found of nearly a dozen drafts and fragments, all on the subjects of wage, price, job, and production decisions under incomplete information. An economics of disequilibrium seemed to be forming. A meeting was suggested to see whether we spoke the same language and thought the same theorems.' It was held on January 25–26, 1969, at the University of Pennsylvania, where Phelps then taught. The ten papers from this gathering (plus two more commissioned to cover gaps) became 'the Phelps volume,' *Microeconomic Foundations of Employment and Inflation Theory* by 15 authors (Phelps *et al.*, 1970). No editor was named, but Phelps wrote the introduction and was listed first among the authors, with the others listed on the cover in the order in which their papers appeared in the book. In addition to the introduction, Phelps contributed a revised version of his 1968 *Journal of Political Economy* article (which had inspired many of the contributions by other authors) and a joint paper with Sidney G. Winter, Jr, on 'Optimal Price Policy under Atomistic Competition.' The conference and the subsequent conference volume gave a decisive impetus to formal research on the microeconomic foundations of macroeconomics, changing not the specific models and theories that macroeconomists propounded or the policies they advocated, but the methodology through which they conducted macroeconomics, whether New Classical, Real Business Cycle, or New Keynesian (see Phelps, 1990a, for an overview of these schools of macroeconomic thought). Phelps (1995b, p. 13) acknowledged Lerner (1949) and Fellner (1959) as having had the concept of a natural rate:

> The postulate that inflation was neutral for the equilibrium path of output, employment and some other 'real' variables was introduced by Abba Lerner in the 1940s and by William Fellner (a great teacher of mine) in the 1950s. Perhaps my 1967 paper and Friedman's were more emphatic and explicit

> about homing in to the natural rate (on which I was more cautious in my 1968 paper).

But while Lerner (1949), Fellner (1959), and Friedman (1968) had the idea of the natural rate, Phelps *et al.* (1970) showed economists how to use the concept in modeling macroeconomic dynamics with explicit choice-theoretic foundations. Phelps (1995a, p. 103) refers to 'Milton Friedman's critique of the Phillips curve, in which nothing useful was put in its place.' The 1970 'Phelps volume' put something in its place, a methodological approach that macroeconomists could use.

Phelps (1967, 1968; Phelps *et al.* 1970) and Friedman (1968) saw what Phelps (1967) termed 'equilibrium unemployment' as voluntary investment in search and consumption of leisure, plus structural unemployment (mismatching of workers and jobs due to unforeseen changes in the mix of skills and locations demanded by employers). Equilibrium unemployment, what Friedman called the natural rate of unemployment (by analogy to Knut Wicksell's natural rate of interest), is not quite the same as optimal unemployment: if income taxes distort the consumption/leisure trade-off or payroll taxes depress labor demand, then equilibrium employment will be less (and unemployment greater) than what is socially optimal. Also, Phelps (1973a) noted, inflation is a form of taxation (also a theme of Keynes, 1923), so that if government revenue is needed to pay for public goods and the possible sources of tax revenues are all distorting, the optimal level of the inflation tax must be chosen jointly with the optimal levels of other distorting taxes. But deviations from equilibrium unemployment are the fault of incomplete information: if actual inflation equals expected inflation, however high or low that inflation rate may be, unemployment will be at its natural rate, implicitly assumed to be unique. Unemployment less than the natural rate requires, according to the natural rate hypothesis, that some workers are fooled into giving up valuable leisure in exchange for a smaller real wage than they think they are getting. In contrast, John Maynard Keynes (1936) saw unemployment as an excess supply of labor, a failure of market-clearing that keeps some workers involuntarily unemployed even though they would accept jobs at the prevailing real wage or a lower real wage.

In his introduction to Phelps *et al.* (1970, p. 20n), Phelps reported,

> My too-brief search of the literature for the scholarly purposes of this study turned up few writers before Keynes (or after) who ever asked why quantity effects should be expected to accompany the price effects of monetary and other macroeconomic disturbances. To my surprise, one of the few, D.H. Robertson [1929], put his finger on the above behavior of markups: 'The stimulus of rising prices is partly founded in illusion ... [the business leader] is spurred on ... by imaginary gains at the expense of his fellow business men. It is so hard to believe at first that other people will really have the effrontery or the good fortune to raise their charges as much as he has raised his own.'

Fisher's *The Money Illusion* (1928) shared that insight: price changes cause quantity changes because agents, whether workers (households) or firms, have only imperfect information about whether a change in their nominal receipts represents a change in their real income due to a relative price shift (see also Stigler,

1961 on the economics of information). Although Lucas (in the articles collected in Lucas, 1981) is now generally associated with it, Phelps (1969) introduced the 'islands model' of imperfectly communicating markets (see also introduction to Phelps *et al.*, 1970, pp. 6–7, and Phelps, 1990a, p. 12), to which Lucas added rational expectations while preserving Phelps's result about quantity effects due to agents adjusting their estimate of the general price level by only a fraction of any observed change in their own prices. Phelps 'found it instructive to picture the economy as a group of islands between which information flows are costly' with an auction on each island every morning determining that island's market-clearing money wage and employment (Phelps *et al.*, 1970, p. 6). While workers could observe the money wage offered to them on their own island, they would not incur the cost of continuously monitoring prices and money wages on other islands. If the workers on an island observed an increase in their money wage, they had to evaluate the likelihood that this represented an increase in their real wage due to a change in technology or the composition of demand (in which case they would wish to supply more labor), as opposed to a nominal shock raising prices and money wages across all islands (in which they would not wish to change the amount of labor they supplied). The more often past changes in money wages had turned out to be real wage changes (relative price shocks), the more employment would respond to any alteration in the money wage. Phelps (1969) used this framework to explain why, with costly information flows, nominal shocks have short-run real effects. In place of the adaptive expectations (learning from errors) assumed by Phelps, Lucas (1972) incorporated rational expectations (no systematic mistakes in forecasting) into Phelps's islands model to explain why there would still be an observed correlation between employment and price level changes (because of unpredictable random shocks to prices) even if any systematic monetary policy would be correctly forecast and neutral. Phelps (1995b, p. 21) refers to 'Robert Lucas' (1972) model, based on my parable of imperfectly communicating "islands".' Phelps's role in developing this approach is downplayed in the textbooks: the section in David Romer's *Advanced Macroeconomics* on 'The Lucas Imperfect-Information Model' (Romer, 1996, pp. 241–255) refers just once to the model as 'the Lucas–Phelps model', with a reference to Phelps's introduction to Phelps *et al.* (1970).

Phelps (1965b) had considered whether anticipated inflation affects employment. Phelps (1967, 1968), like Friedman (1966, 1968), held that only unanticipated inflation matters for output and employment. In the Friedman–Phelps expectations-augmented Phillips curve, the rate of increase of money wages and of prices depends on expected inflation and the gap between unemployment (u) and the natural rate of unemployment (u^*), with u equal to u^* when actual inflation π equals expected inflation π^e:

$$\pi = f(u - u^*) + \pi^e$$

with a coefficient of one on expected inflation, as in Fisher's equation relating nominal and real interest. If expectations are adaptive (error-correcting), expected inflation will gravitate towards any steady rate of inflation. To keep u below u^* by continuing to fool workers, the rate of inflation would have to keep accelerating

(even that possibility for systematically stimulated employment and real output would be ruled out by the rational expectations hypothesis). However, Friedman presented this intuition only verbally, whereas Phelps wrote out the equations for the labor market dynamics and drew the famous diagram for the expectations-augmented Phillips curve, showing a vertical long-run Phillips curve (for expected inflation equal to actual inflation) and a family of downward-sloping short-run Phillips curves, each drawn for a particular expected rate of inflation (see Phelps *et al.*, 1970, p. 148). As with Alfred Marshall's 'scissors' diagram of supply and demand, Irving Fisher's two-period consumption-smoothing diagram, and J.R. Hicks's IS/LM diagram, a simple diagram served to capture the trained intuition of the discipline.

The policy implication of the Friedman–Phelps natural rate hypothesis was that attempts to reduce unemployment below its natural rate by expanding aggregate demand would be fruitless in the long run – and would not even be desirable if feasible in the short run, because it would be a policy of tricking workers into surrendering valuable leisure (or truncating useful search that would produce the best matching of workers to jobs). Typically, macroeconomists using natural rate models tended to treat the natural rate of unemployment as unique and as more or loss constant over time, attempting to estimate the natural rate econometrically and deploying natural rate arguments to depict proposals for government action to reduce unemployment and poverty as futile and counter-productive. The monetary misperceptions version of New Classical economics (Lucas, 1981) attributed fluctuations around the natural rate to unpredictable, random nominal shocks, while Real Business Cycle theory (the non-monetary version of New Classical economics) emphasized the impact of technology shocks on potential output and labor demand, with less attention to unemployment. Natural rate models with a constant or slowly changing natural rate of unemployment are by no means as generally accepted (see Stiglitz *et al.*, 1997) as the methodological message of Phelps *et al.* (1970) about the need for explicit choice-theoretic microeconomic foundations of macroeconomics recognizing imperfect information and market frictions. Prolonged US expansions in the past decade and a half have held unemployment well below what NAIRU was believed to be, without rekindling inflation. British and, more recently, Canadian experience has been similar.

But Phelps did not think of the natural rate of unemployment as constant over time. Instead, he has devoted himself to structuralist theorizing about fluctuations in the natural rate (e.g. Phelps, 1994). Nor is he opposed to governmental policies to reduce unemployment and poverty: rather, he opposes misguided, fruitless policies that attempt to achieve those goals without changing the natural rate. He is passionately committed to the quest for constructive measures that will lower the natural rate of unemployment and secure the inclusion of currently marginalized and impoverished workers in the general prosperity. Neither of these aspects of Phelps is brought out in the 33-page summary by the Royal Swedish Academy of Sciences (2006) of 'Edmund Phelps's Contributions to Macroeconomics.' Apart from Phelps's paper on 'The Trouble with Rational Expectations and the Problem of Inflation Stabilization' (in Frydman & Phelps, 1983), the only reference that the Swedish Academy makes to anything that Phelps has published in the three decades since 1978 is a paragraph about Phelps (1994), plus a passing

remark that, like Phelps (1968), Phelps (1994) considers the relationship between a firm's relative wage and its labor turnover (Royal Swedish Academy, 2006, pp. 10, 14–15). Nor, among Phelps's earlier writings, does the Royal Swedish Academy (2006) cite the books he edited on *Economic Justice* and on *Altruism, Morality and Economic Theory* (Phelps, 1973b, 1975), although the concerns central to those books can be seen as motivating his macroeconomic research.

3. Structuralist Macroeconomics

The Royal Swedish Academy of Sciences (2006, p. 14) noted that

> A lasting contribution from this book [Phelps, *Inflation Policy and Unemployment Theory*, 1972a] is the idea of *hysteresis* in the unemployment rate: an increase in unemployment may turn out to be (partially) irreversible, as a result of workers' loss of skill and morale. . .. Phelps's idea remained largely ignored for more than a decade, but came to life again in the mid-1980s when economists struggled to understand the seemingly permanent rise in European unemployment

with a footnote reference to 'the influential study of European unemployment by Layard *et al.* (1991).' The Swedish Academy added that the persistent European unemployment also led Phelps to study the structural causes determining equilibrium unemployment in *Structural Slumps* (Phelps, 1994) and 'in a number of journal articles' (no dates or other details given): 'This work forms part of a comprehensive research literature that has developed over the last twenty years, to a large extent inspired by the work of Layard, Nickell and Jackman (1991).'

This brief account by the Royal Swedish Academy of Sciences underplays Phelps's role in the revival of a structural changes of an endogenous equilibrium unemployment rate based on his 1972 analysis of hysteresis. The Swedish Academy did trace the concept of hysteresis to Phelps (1972a), whereas the widely-read textbook by David Romer (1996, pp. 469–473) starts from Blanchard & Summers (1986) without mention of Phelps. However, Fitoussi & Phelps (1986, 1988), Phelps (1988), and Calvo & Phelps (1983) were not inspired by Layard *et al.* (1991), which they predated, but instead built directly upon Phelps (1972a, 1978a). The names of Richard Layard, Stephen Nickell, and Richard Jackman do not appear in the references or index of Fitoussi & Phelps (1988), Phelps (1990a, p. 98) has one passing mention of Layard and Nickell in a list of authors on the wage curve, and Phelps's interest in 'unemployment considered as an *equilibrium phenomenon* springing from *endogenous job rationing*, hence involuntary' (Phelps, 1992a, p. 1476) predating their important and valuable book. Possibly the author or authors of the Swedish Academy study misread a footnote in Phelps's review article on Layard *et al.* (1991), stating 'my feelings that what I refer to as the *structuralist*, or sometimes the *modern-equilibrium*, paradigm is the seminal development of the past decade and, in any case, the development from which the work under review stems' (Phelps, 1992a, p. 1477n) – that is, Layard *et al.* (1991) stemmed from a body of work in which Fitoussi & Phelps (1986, 1988) figured prominently, not that his work

on structuralist macroeconomics stemmed from Layard *et al.* (1991). Phelps (1992a, p. 1489) concluded,

> The authors have taken a huge risk in throwing out nearly the whole corpus of general equilibrium theory in favor of a focus on some social and political parameters. When they do throw in a macro variable, such as the trade balance, no open-economy variable is provided to underpin it. Since there is no apparent effort to analyze the influence of their explanatory variables alongside that of standard economic variables we cannot have much confidence in their findings. There are not many findings in this volume that I am persuaded by, so far. Maybe for that very reason I have also felt challenged by this work. It would not surprise me that a great many economists will want to see whether they can do better.

Phelps's structuralist macroeconomics (which is distinct from the Post Keynesian usage of the same term by Lance Taylor, 1983) emphasizes the dependence of the equilibrium unemployment rate (the natural rate) on past rates of unemployment (hysteresis), payroll taxes and labor market legislation, and on real exchange and interest rates. That payroll taxes, unemployment benefits, and restrictions on the hiring and firing of workers matter for employment, and in particular for the high European unemployment of the 1980s and 1990s, is generally accepted, and many if not most macroeconomists use the concept of hysteresis introduced by Phelps (1972a). The role of the real interest rate and real exchange rate in determining equilibrium unemployment in an open economy is more distinctively connected with Phelps and his associates Jean-Paul Fitoussi, Hian Teck Hoon and Gylfi Zoega (Fitoussi & Phelps, 1986, 1988; Phelps, 1994; Phelps & Zoega 2001; Hoon & Phelps, 2007). This sets their approach apart from supply-side economics, which focuses more narrowly on the impact of tax incentives on factor supplies, and from real business cycle theory, which emphasizes random shocks to productivity growth (see the chapters on supply-side economics and real business cycles in Phelps, 1990a). One notably thought-provoking application of this structuralist approach is the claim that the fiscal policies of the Reagan Administration were expansionary for the US but contributed strongly to high European unemployment in the 1980s. The Reagan Administration's tax cuts, increased defense spending, and record budget deficits (together with the tight money policy of the Volcker Federal Reserve) sharply raised real interest rates throughout the world, reducing investment in physical and human capital. In Europe, the contraction of investment was not offset by the US fiscal expansion that had pushed up real interest (which raises questions, however, about the impact on European exports of the appreciation of the US real exchange rate in the 1980s, another result of US monetary and fiscal policy).

Frydman & Phelps (1983) expressed reservations about rational expectations as an inherent property of economies. Phelps (1995a, p. 102) remarks that,

> An agent cannot use the analyst's model to form his expectations since he has little or no idea of how, quantitatively, the other agents are using that model or even if they have not switched to some quite different model ... the expectations-of-expectations problem may prevent agents from converging to the rational-expectations equilibrium. The scepticism and hostility that research

> so admirably basic as this met in the profession was sad to see, even for a near 50-year-old veteran such as myself who had seen the tactics of 'scorn and derision', in Harry Johnson's memorable phrase, used before.

In his Nobel Lecture, Phelps (2007, pp. 544–545) criticizes neoclassical economic theory (as exemplified by Samuelson, 1947) for having

> *abstracted* from the *distinctive character* of the modern economy – the endemic uncertainty, ambiguity, diversity of beliefs, specialization of knowledge, and problem solving. As a result it could not capture, or endogenize, the *observable phenomena* that are endemic to the modern economy – innovation, waves of rapid growth, big swings in business activity, disequilibria, intense employee engagement, and workers' intellectual development … At Yale and at RAND, in part through my teachers William Fellner and Thomas Schelling, I gained some familiarity with the modernist concepts of Knightian uncertainty, Keynesian probabilities, Hayek's private know-how and M. Polanyi's personal knowledge. Having to a degree assimilated this modernist perspective, I could view the economy at angles different from neoclassical theory.

This approach to incomplete knowledge contrasts with the rational expectations hypothesis (see also Phelps, 1990a, Ch. 3). As with Phelps's structural modeling of a changing equilibrium rate of unemployment, his view of uncertain knowledge is not stressed by those, such as the Royal Swedish Academy of Sciences (2006) or Henderson (2006), who prefer to celebrate the Phelps–Friedman natural rate hypothesis simply as setting the stage for New Classical economics.

4. Conclusion

Friedman (1966, 1968) and Phelps (1967, 1968) each independently introduced the natural rate hypothesis and the expectations-augmented Phillips curve, advancing the concept of equilibrium unemployment in place of Keynes's excess supply of labor, but only Phelps did so in the context of a formal model. The 'Phelps volume' (Phelps *et al.*, 1970) marked a major advance in choice-theoretic microeconomic foundations of macroeconomics subject to imperfect information and market frictions, such as the 'islands model' of Phelps (1969). That much is well recognized, notably by the Royal Swedish Academy of Sciences (2006), as are Phelps's reservations in Frydman & Phelps (1983) about the informational requirements of rational expectations, buttressed by empirical evidence that expectations are at least in part backward-looking. But the Royal Swedish Academy (2006) gives a quite misleading picture of Phelps as someone who contributed little to macroeconomics in the last three decades, giving Phelps (1994) only a passing paragraph, stressing the supposed inspiration by Layard *et al.* (1991). On the contrary, Phelps's work on structural booms and slumps, looking at non-monetary determinants of changes in the equilibrium unemployment rate, is a continuous development, a substantial and important body of work stretching from Phelps (1972a) on hysteresis through Calvo & Phelps (1983) on non-Walrasian equilibria and Fitoussi & Phelps (1986, 1988) on Europe's structural slump in the 1980s to Phelps (1988, 1994), Phelps & Zoega (2001)

on structural booms, and on to the present (Hoon & Phelps, 2007, forthcoming). Much of this work (e.g., Phelps, 1994a; Phelps & Zoega, 1998) stresses empirical testing of structuralist macroeconomics against competing Keynesian, supply-side, and New Classical approaches.

Leijonhufvud (2004, pp. 814–815, reviewing Aghion *et al.*, 2004) gives an insightful account of where Phelps stands in macroeconomics:

> Although Phelps distinguishes himself as a 'structuralist' rather than a 'New Keynesian' (cf., Phelps, 1990a), he has played an important role in the development of New Keynesianism and remains close to this school. What he has in common with the New Keynesians above all is the view that labor markets will settle down to equilibria where jobs are rationed at equilibrium wage rates. To New Keynesians, and to Phelps, therefore, the natural rate of unemployment is not an efficient state but one that might potentially be improved by policy, albeit not by just inflating nominal aggregate demand.

The last remark draws attention to another central characteristic of Phelps overlooked in Royal Swedish Academy (2006). He cares passionately about the justice and morality of economic processes and outcomes (Phelps, 1973b, 1975, 1987, influenced by Rawls 1971), and is no mere high-brow, abstract theorist, but somehow who devotes his expertise as an economic theorist to devising macroeconomic policies, labor market reforms, and tax incentives to make capitalism more inclusive and to raise the incomes and facilitate the self-sufficiency of the poorest and marginalized in society (Phelps, 1997, 1999a, 2002a, 2003b). Phelps does not just describe the equilibrium unemployment rate – he proposes to change it.

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