



The natural rate of unemployment and the NAIRU

Roger E. Backhouse^a, James Forder^b, Christina Laskaridis^{c,*}

^a University of Birmingham, UK

^b Balliol College, Oxford, UK

^c Open University & University of Oxford, UK

ARTICLE INFO

JEL codes:

B22

E24

J64

E31

Keywords:

Natural rate of unemployment
Nonaccelerating inflation rate of unemployment
Inflation
History of macroeconomics
European macroeconomics

ABSTRACT

The usages of the terms ‘natural rate of unemployment’ and ‘NAIRU’ (Non-Accelerating Inflation Rate of Unemployment) in English-language publications are considered and compared. It is argued that contrary to what has sometimes been suggested, there is no consistent difference in the economic theory underlying the two ideas. However, there is, to a significant extent, and particularly in the 1980s, a difference in the way the two terms were used: choice of language typically depended on the questions being addressed. That difference, in turn, arose substantially from the different macroeconomic experiences of the US and Europe. In the 1980s, faced with persistently high unemployment, European economists developed structural econometric models seeking to understand the determination of ‘the NAIRU’. In later years, as economic circumstances changed, usage became more homogeneous and choices about it seem to have been much more a matter of personal taste or habit.

1. Introduction

The simultaneous rise of inflation and unemployment in the 1970s gave rise to a rethinking of macroeconomic theory, the demise of the ‘Keynesian’ consensus and, after a period of some turmoil, the development of an alternative approach which put the long run neutrality of money at the heart of thinking. To that extent, developments were similar all round the world. But the European experience was distinct from others, and particularly from the American because, having risen dramatically at the beginning of the 1980s, unemployment remained very high for much of the decade whereas, in the United States, once inflation was controlled, unemployment quickly fell (see Fig. 1). As Goutsmedt and Truc (this issue) show, these circumstances in Europe gave rise to various lines of research which had a distinctively European origin or orientation. One was the development of ‘disequilibrium’ macroeconomics strongly associated with francophone economists such as Jacques Drèze, Jean-Pascal Benassy, Guy Laroque, Yves Younes, and Jean-Michel Grandmont (see also Backhouse and Boianovsky (2013)).¹ Another, with which this paper is concerned, was an attempt to provide theoretical explanations of unemployment with models of imperfect competition, wage bargaining and other supply-side factors, together with related econometric modelling, centred on the concept of the NAIRU or Non-Accelerating Inflation Rate of Unemployment.

Mention of the ‘NAIRU’ immediately raises the issue of how it relates to the ‘natural rate of unemployment’ (NRU). That

* Corresponding author.

E-mail address: christina.laskaridis@open.ac.uk (C. Laskaridis).

¹ General equilibrium models with rationing were part of the broader quest for microeconomic foundations for macroeconomics, but in Europe – specifically France and Belgium – developed from early 1970s in an effort to address some of the weaknesses of general equilibrium theory (see Plassard and Renault, this issue).

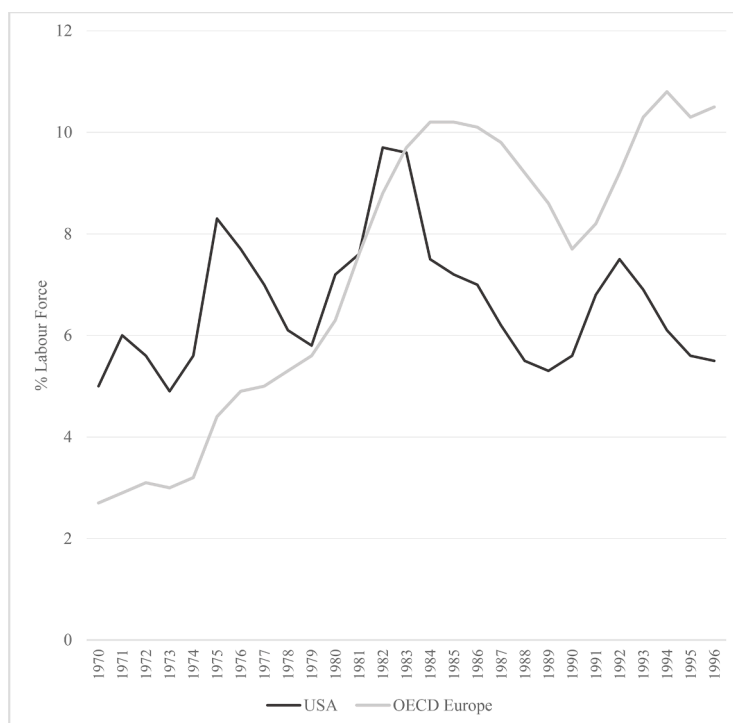


Fig. 1. Unemployment rates. Source: OECD (1990) AND (1996).

terminology was introduced by Friedman (1966) and more famously Friedman (1968) in commenting on the question of whether there might be a long term trade-off between inflation and unemployment. Like the NAIRU, it describes a world of the 'vertical long run Phillips curve' and both ideas therefore make the solution to the problem of unemployment ultimately one of the supply-side. The two terms therefore seem to have a very similar meaning, and a question arises as to what the difference between them might be.²

Many possible distinctions can be imagined, and indeed, various explanations have been advanced. Usually, though, such points have been made very casually or just as asides, and it seems the question has never been treated with much attention to the actual usage of the terms by economists. It has been proposed, for example, that the foundations of the theory of NAIRU are essentially imperfect competition, whereas formulations of the idea of the NRU involve perfect competition.³ In some instances, therefore, the implication could be that unemployment referred to by the NRU is voluntary, while some of that existing at the NAIRU is involuntary. Related to that line of thinking, the emergence of the idea of hysteresis in unemployment is sometimes tied to the idea of the NAIRU, so that the terminology indicates the possibility of path-dependence in a way in which the idea of the natural rate does not permit.⁴ Other possibilities could be suggested. One might be that the NRU describes an equilibrium of a model in which money is neutral, whereas the NAIRU arises in one in which it is not. Ideas like those make the distinction one of theory, and hence suggest that an economist's choice of label indicates something about the model under consideration, even if the model itself is not stated.

Alternatively, it has sometimes been suggested that the choice of terminology is reflective not of an author's theory, but of an attitude. So, for example, it has been said that a preference for 'NAIRU' marks an aversion to Friedman or other aspects of his economics or, along the same lines, that 'NRU' is generally preferred by those of right-wing politics.⁵ A variation of this would be that the

² Indeed, there are other labels that were also briefly used, but without catching on. The 'constant inflation rate of unemployment' was a term used by Samuel Brittan, and occasionally by others, such as Andrews and Nickell (1982), who used it as well as 'natural rate', and Layard (1982). Phelps (1970, p. 13) said that he had previously used the expression 'warranted rate' and referred to others who had used 'normal rate', and 'full employment rate', all with the intent of indicating where the Phillips curve would be vertical. The case of the 'noninflationary rate of unemployment' used by Modigliani and Papademos (1975) is slightly different because as noted by Rancan (2020) they saw their idea as theoretically distinct from Friedman's. The point was perhaps made clearer in Modigliani (1986) where, referring to the discussion of the NIRU in Modigliani and Papademos (1978), the author said he and Papademos had suggested that 'the notion of a natural rate should be replaced by that of a Non-inflationary Rate of Unemployment (NIRU) on the left of which the long-run Phillips Curve would be vertical, while on the right it would have the traditional properties'.

³ Jenkinson (1987) sharply distinguished the two ideas on this basis, concluding that variations in price-setting behaviour were so significant as to lead to the conclusion that whilst one might think in terms of a (varying) NAIRU, the natural rate did not exist.

⁴ Various works of Rod Cross, such as Cross (1987) seem to treat the terminology in this way.

⁵ Gramlich (1979, p. 133) made the two conceptually identical, and said that 'conservative economists' used the term 'natural', and liberal economists 'nonaccelerating inflation' rate of unemployment, but commented that the latter was more precise (p. 134).

expression ‘natural rate’ suggests something inevitable or perhaps desirable about the rate, causing some economists to avoid the term.⁶ Nevertheless, even this type of distinction fades away in light of such documents as [Organisation for Economic Co-operation and Development \(1994\)](#), which propounded a strategy for European unemployment reliant on making labour markets more flexible and implementing related structural reforms, and presented it in terms of the ‘NAIRU’. And sometimes, perhaps, it seems that the ‘NAIRU’ is not much more than a British or European name for the ‘NRU’.

In none of these cases would there be any difficulty in finding examples which appear to confirm the idea. On the other hand, it is at least as easy to find examples that seem contrary to it. There is always the possibility that one or other of these ideas has a proper foundation in the literature and apparent contradictions are to be explained as mistakes in the use of terminology.

Our argument is that, looking at the actual usage of the labels in the 1970s and 1980s, there was no substantive or systematic *theoretical* distinction between the NRU and the NAIRU. Both describe the equilibrium of unemployment in a model where in the long run money is neutral, subject to reservations which might appear in either case, the labour market clears, and unemployment is therefore fundamentally a supply side problem. Instead, we argue that the origin of the distinction lies in the different questions being addressed. In this period when the expression ‘natural rate’ was used, the matter in question was usually related either to a question of a purely theoretical kind, or to the estimation of some aspect of the inflation-unemployment trade-off.⁷ On the other hand, when the ‘NAIRU’ was discussed, the central issues were about the econometric estimation of the rate of unemployment at which inflation would be stable.⁸ Our conclusion is consistent with the finding of Goutsmedt and Truc (this issue) that, while there was a broad internationalization of economic theory, transatlantic differences remained stronger in empirical work. Although the NAIRU was associated with theoretical differences—for example, the American literature paid much less attention to wage bargaining, crucial to many models of the NAIRU—such theorizing was never far from the analysis of data and the explanation of European problems.

As well as reflecting the actual usage we observe, this account goes a long way to explaining some of the other, more impressionistic, ideas that have been advanced about the two labels. Discussions of the terms of the inflation-unemployment relationship were more prevalent in the United States than anywhere in Europe, whereas the econometric focus on the supply-side determinants of the inflation-safe level of unemployment was predominantly a British enquiry. Similarly, no doubt because of the persistence of unemployment in Europe (as shown in [Fig. 1](#)), the question of hysteresis attracted much more econometric research there than it did in the United States. The concern with those supply-side issues is naturally associated with the issue of what measures will reduce unemployment. On the other hand, the econometric project of investigating the terms of the trade-off – for example, to determine the speed with which inflation expectations adjust – does not in itself raise such matters. Hence, it is easy to see how, at least for a time, a vague impression of the ‘NAIRU’ being a term favoured by the political left and the ‘NRU’ by the right, could develop. Our view may also explain why there was never much debate over which was the appropriate term to use. Since they were being deployed in different contexts, the issue might simply never come up. It should be clear, of course, that whilst we can see this difference in the early usage of the two terms, that difference does not imply any fundamental theoretical difference. The point that persistent inflation cannot permanently lower unemployment does not in any way impinge on the study of the supply-side determinants of equilibrium unemployment. Nor is there anything about the study of the terms of the short-run trade-off or its rate of deterioration, that presupposes that supply-side policy could not move the ‘natural rate’.⁹

Although such evidence needs to be treated very cautiously, the background to the paper is evidence of the use of ‘NRU’ and ‘NAIRU’ that comes from tracking their appearance in European and American journals, with details of definitions and calculations being provided in the Appendix.¹⁰ [Section 2](#) starts with a discussion of the way the words were used in the United States and Europe in the 1970s. [Section 3](#) covers the American uses of them from the end of the 1970s and 1980s, and [Section 4](#) examines the emergence of a distinctively European approach to unemployment. We close with [Section 5](#) with the 1997 symposium on the NRU/NAIRU in the *Journal of Economic Perspectives*. By this time, circumstances had changed significantly since the 1980s: European unemployment had improved, inflation was no longer a major problem in either continent, and fluctuations had subsided to the extent that the period came to be described as that of a ‘great moderation.’ With the collapse of the Soviet Union, German reunification and the move towards the Euro, attention turned elsewhere. [Section 6](#) offers our conclusions.

⁶ That sort of view seems to underlie the objections to the terminology made by [Haberler \(1974, p. 180\)](#) who commented that ‘equilibrium unemployment’ would be a better term. [Hall \(1974, p. 361\)](#) also preferred that expression, saying he was following Phelps and giving the explanation that Friedman’s terminology ‘seems to suggest’ that the rate of unemployment in question is the desirable rate. [Baily \(1976, p. 586\)](#) rejected Friedman’s term because ‘this rate is neither “natural” nor optimal’. Along the same lines, no doubt, [Tobin \(1983, p. 512\)](#) said that the concept was ‘more neutrally’ described by the term ‘NAIRU’. [Samuels and Paavola \(1996\)](#), in due course, asserted the labelling was political and ideological. [Vickrey \(1993\)](#) described the term as ‘one of the most vicious euphemisms ever coined’, preferring his own variation in the ‘NAIRU’ – ‘non-inflation-accelerating rate of unemployment’.

⁷ What was at issue, of course, was the terms of a *short-run* trade off. As argued at length in [Forder \(2014\)](#) here was practically no estimation of the terms of any long-run trade off.

⁸ The argument that language is modulated in relation to the types of claim being made is not new. One example from the history of economics is the argument of [Henderson, Dudley-Evans, and Backhouse \(1993\)](#) that language tends to be softened when making claims that threaten the reputation of other scientists.

⁹ Indeed, although the point is sometimes forgotten, [Friedman \(1968\)](#) was explicit in stating that the natural rate would be affected by such things.

¹⁰ Counts of the number of times the two terms were used must be treated with great caution. Economists and the journals in which they publish have increasingly become international; some articles are much more significant than others; there are problems defining the appropriate corpus, especially in a multi-lingual continent; and there are difficulties in obtaining consistent data. Notwithstanding these problems, such counts provide an approximate picture of what was happening.

2. Different questions, different terminology: the 1970s

2.1. Distinct uses of the Phillips curve

To understand why two terms for what was essentially the same phenomenon emerged in the 1970s, it is useful to look briefly at the background: discussions of the Phillips curve in the 1960s. In Britain, ‘the Phillips curve’ was generally treated, as it had been in Phillips (1958) and Lipsey (1960), as a depiction of the effects of various levels of demand, as represented by the level of unemployment, on wages. It therefore depicted demand-pull inflation. Since the balance of professional opinion in Britain took the inflation of the time to be caused by cost-push factors, ‘the Phillips curve’ was often treated as representing an incorrect hypothesis. For example, when Hines (1964) presented what he said was an econometric demonstration of the salience of cost-push inflation, he specifically treated it as a rejection of the Phillips hypothesis. In the United States, in contrast, the Phillips curve was treated in the manner of Samuelson and Solow (1960), as an empirical relationship to which alternative theoretical explanations could be attached. This meant that in the American usage, ‘the Phillips curve’ could just as well be a depiction of cost-push as demand-pull inflation.¹¹ The fact that Samuelson and Solow themselves, and later Friedman (1968), for example, treated ‘the Phillips curve’ as a relationship between unemployment and inflation (of prices), rather than wage change, is an aspect of this difference.

This eclectic interpretation of the Phillips curve explains why in the 1970s, it was natural to think in terms of ‘the Phillips curve’ when addressing the deterioration of the inflation-unemployment relationship, no matter what explanation was being given.¹² The explanation that emerged most prominently was one focussing on expectations of inflation and so, following Friedman (1968), the terminology of the ‘natural rate’ was widely adopted in the United States in connection with ‘the Phillips curve’. A clear example is the series of econometric papers by Robert J Gordon on the acceleration of inflation, starting with Gordon (1970), which challenged Friedman’s view, through to Gordon (1977), which confirmed it. It was not just supporters of Friedman who argued in this way. For example, Smith (1970, p. 778) commented that ‘the concept of a “natural rate of unemployment” had not been properly established, also in the context of discussing ‘Price expectations and the Phillips curve’ (p. 775). Similarly, Tobin (1971) deployed what he called the ‘Phillips curve’ (p. 513) in discussing accelerationism and gave a formal definition of the ‘natural rate’ (p. 512) in doing so. Solow (1971, p. 63) used the term in addressing the question of whether there was an inflation-unemployment trade-off. Phelps (1972, pp. 77-80) also used the expression ‘natural rate’ in the context of discussing long- and short-run relationships between inflation and unemployment, including, briefly, those involving hysteresis effects. Thus, American discussion of policy related to a deteriorating inflation-unemployment relationship that was consistently framed in terms of the Phillips curve and hence ‘the natural rate’.

2.2. Early uses of ‘Natural Rate’ and ‘NAIRU’ in the US

Fig. 2 shows the total use of the two terms in JSTOR, Kyklos and the EER.¹³ The use of ‘natural rate’ began with Friedman’s introduction of it in the 1960s, and the first use of ‘NAIRU’ came in the mid-1970s. While the expression ‘natural rate’ appears more often overall, the use of the term ‘NAIRU’ grew rapidly in the 1980s. As will be argued in Section 4 and with the data in Fig. 3, ‘NAIRU’ was being used more frequently in European journals. From the millennium the use of both terms declined significantly.

Although most American economists used the term ‘natural rate,’ ‘the NAIRU’ appears also to be, strictly speaking, an American invention, originating in Brookings conferences.¹⁴ The first usage appears to be Tobin (1976), with the subsequent other early uses of the term also appearing in *Brookings Papers on Economic Activity* (Baily (1976), Baily and Tobin (1977), Seidman (1978)) without indication of where the term may have come from. The first use by Tobin was made in a comment on Wiseman (1976) which discussed the use of direct public-sector employment in tackling recession. Tobin said that a question arose as to ‘the usefulness of public-service employment as a measure for improving the Phillips-curve trade-off between inflation and unemployment and lowering the nonaccelerating-inflation rate of unemployment’ (p. 108). He suggested that workers in public-employment programmes continue to look for other jobs, and therefore continue to contribute to the restraint of wage increase, almost as much as if they remained unemployed. The slope of the Phillips curve would therefore be more favourable if public employment were raised than if private employment were. Although, like the ‘NRU’, the ‘NAIRU’ appeared in a discussion of ‘the Phillips curve’, it was also concerned with specific ideas about improving labour market outcomes rather than anything to do with accelerationism. That aspect was continued in other American discussions of the NAIRU from the 1970s. For example, when Wallich and Weintraub developed the idea of tax-based incomes policy, this was treated by others, such as Seidman (1979) or Slitor (1979) as a means of lowering ‘the NAIRU’. Early uses of ‘NAIRU’ in JSTOR do not refer to Tobin’s (1976) comment.¹⁵ Rather, Slitor (1979) referred to the NAIRU in the context of Seidman (1978) proposal to use tax-based incomes policy to reduce it, Wachter (1976) to his previous contribution in the same Brookings issue

¹¹ This point is made in Forder (2014, ch. 3)

¹² This is the subject of Forder (2014, ch. 4) where chapter and verse can be found.

¹³ Details of the search and choice of journals can be found in the Appendix.

¹⁴ As we explain, the explanation of this seems to lie in the questions being addressed in the Brookings Institution. Any idea that there was an institutional preference for that label, however, is dispelled by the fact that there were more references to the ‘natural rate’ than to the NAIRU in *Brookings Papers on Economic Activity*.

¹⁵ The paper in which Tobin’s comment appears has been cited 4 times according to Web of Science and 32 according to Google Scholar. Of the citing articles that could have played a role in the transition of the term, meaning those published up to 1980, citations of the paper do not refer to NAIRU but rather to the role of the federal government in public employment programmes and inflation in the context of an assumed trade-off.

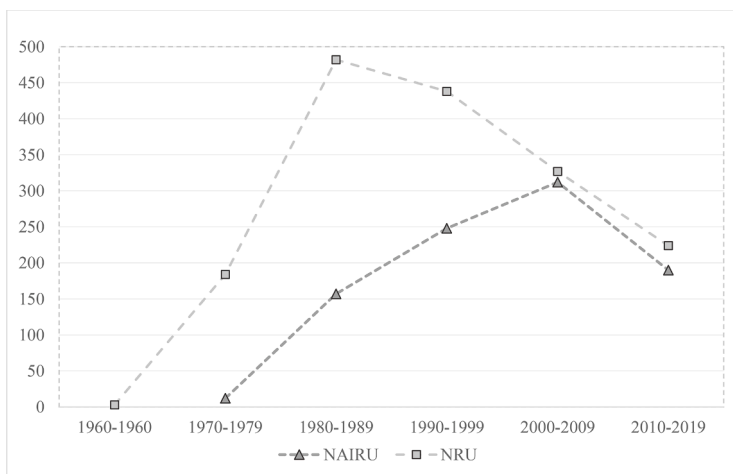


Fig. 2. Uses of terms in JSTOR, Kyklos, & EER. Source: see appendix.

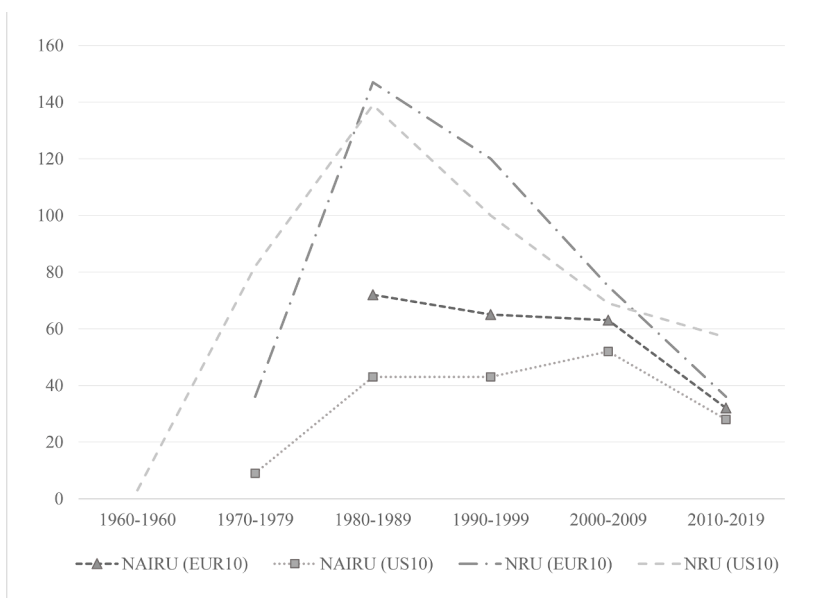


Fig. 3. Uses of terms in selected US and EUR journals. Source: see appendix, which provides a list of journals in each category.

as Wiseman and Tobin, which referred to an alternative terminology of ‘non inflationary rate of unemployment’ and the work of Modigliani and Papademos (1975). Okun (1978) introduced NAIURU as an alternative equivalent to the ‘natural’ rate, again without reference to its origin. This, and other such examples, suggest that the term was initially used without anyone feeling a need to refer to its origin, possibly as a convenient alternative to what was an already familiar concept.¹⁶ The significant aspect of these early uses of the ‘NAIURU’ is that, although they accept the accelerationist idea, without feeling any need to debate it, they are enquiring into the determination of the inflation-safe level of unemployment, not the deterioration in the inflation-unemployment trade-off. Some of these discussions even leave open the question of whether there was a Phillips curve in that, while they assume that inflation will accelerate at unemployment rates below the NAIURU, they say nothing about what happens at higher rates. This contrasts to literature

¹⁶ It is possible subsequent users of the term ‘NAIURU’ took it from Tobin, but they did not cite him. Equally, it may be that the term was invented independently by more than one economist. Nothing hinges on this. We take a cautious view of the relationship between citation counts and a measure of a paper’s influence, for various reasons, including those explored in Forder (2021). For reference, even citations of the papers that made early uses of NAIURU and were those citations took place before 1980, were few and far between. According to Google Scholar, Slitor (1978) was cited twice before 1980, Wachter (1978) four times, Okun (1978) four times, Buiter (1978) six times and Seidman et al., (1978) eight times before 1980. And these are not citations for the use of the term ‘NAIURU’.

where the accelerationist hypothesis is being discussed in the context of ‘the Phillips curve’ and in which the term ‘natural rate’ is used.

Tobin’s usage illustrates the way choice of terminology was connected to the question being addressed rather than, for example, as a consequence of hostility to Friedman’s views. He was a prominent critic of Friedman’s approach to macroeconomics and yet, in Tobin (1972), he seemed perfectly content to use the language of the ‘natural rate’ and ‘the natural rate hypothesis’. The same is true of Tobin (1974, 1977) and other papers. In these cases, he was concerned with the issue of the macroeconomic relationship between inflation and unemployment. In contrast, in his comment on Wiseman, cited above, or in Baily and Tobin (1977), the issue was the microeconomics of the determination of the stable-inflation rate of unemployment, and there, he used different terminology. In the latter case, the terms are used interchangeably, and refer to how wage subsidies, and other job creation measures could alleviate unemployment in the long run. The same distinction can be seen in Tobin (1980) where he used both the expressions ‘natural rate’ and ‘NAIRU’. In some places, they might appear to be interchangeable, even if Tobin sometimes seems to indicate a preference for the latter.¹⁷ However, he also seems to contrast them, asking the question ‘How are such high NAIRUs to be rationalized by theorists who associate the “natural” rate with an equilibrium in which unemployment represents voluntary choice and efficient search?’ Answering his own question, he suggested a string of possible supply-side explanations. Again, it appears that the ‘NAIRU’ was associated specifically with the microeconomics of the determination of the stable-inflation rate of unemployment.

To sum up the situation in the United States, the two terms came into use at roughly the same time, during the 1970s, to refer to essentially the same phenomenon, and no one tried to articulate possible differences between them. This meant that, almost inevitably, to use a statistical metaphor, the correlation between terminology and the problems being tackled is not perfect: there is inevitably some noise, due to individual idiosyncrasies if nothing else. For example, Wallich (1978) used the term ‘natural rate’ in discussing the effects of tax-based incomes policy; and for a while, Baily seems to have been happier to use ‘NAIRU’ whatever the subject matter.¹⁸ Nevertheless, as a general proposition, there does seem to be a pattern to the use of the two terms in these early years of the discussion. The ‘natural rate’ is associated with the Phillips curve and investigation of the trade-off between inflation and unemployment; the ‘NAIRU’ is associated with the microeconomic determination of the critical rate of unemployment – or, as one could say, with the endogenization of the ‘natural rate’.

2.3. Early uses of ‘Natural Rate’ and ‘NAIRU’ in Europe

In the British literature, which is where most European references to the NRU and the NAIRU in this period are found, the picture is completely different. The term ‘natural rate’ was used, but generally with disapproval. Most authors tended to be overtly sceptical of the idea, or showed reluctance about the terminology, such as by keeping the word ‘natural’ in inverted commas. Bispham (1975) is an example. He used the label ‘natural rate’, defining it as the stable-inflation rate, but it was part of a long discussion raising doubts about monetarism. Similarly Budd (1975) made it the rate that had to be maintained to avoid hyperinflation, keeping the label in inverted commas, and the National Institute of Economic and Social Research (1977) discussed some estimates that had been made of it. Desai (1979) referred to it very briefly. Spindler and Maki (1979) used the expression right at the end of their article as a way to tie ideas together. In their earlier paper, Maki and Spindler (1975), they had argued that increased benefit entitlements would increase the level of unemployment that should be regarded as ‘full employment’. Responding to critics who argued that such benefits had negligible effects, they restated their position, in the end tying the argument together by reference to benefits increasing the ‘natural rate’.¹⁹

The most important exception to this general picture is found in the work of British monetarists associated with Manchester University. Amongst their work, Laidler and Parkin (1975), clearly approved of the term, though even they kept ‘natural’ in inverted commas nearly every time it appeared. This paper is particularly important as it was a major survey commissioned for the *Economic Journal*.²⁰ Elsewhere, Parkin appears to have used the term ‘natural rate’ more approvingly than most others in Britain (such as in Parkin (1973), Parkin (1975) and Parkin, Sumner, and Ward (1976)). In general, the authors contributing to the series of Manchester University books on inflation, who tended to be monetarists, showed much greater tendency to write approvingly of the ‘natural rate’ or ‘NRU’ than others – Duck and Zis (1979), could also be included in this group.²¹ The terminology was also used by those criticising

¹⁷ At one point (p. 60) he said ‘One implication of Phillips curve curvature is that symmetrical cycles about a static NAIRU entail an accelerating drift. A stable inflation trend requires a higher average unemployment rate the greater the amplitude of fluctuations. The natural rate so corrected may have increased in the recent decade’.

¹⁸ A notable instance is Baily (1978), in which he consistently used ‘NAIRU’ in commenting on Perry (1978), which contained much discussion of the ‘natural’ rate, but no mention of the ‘NAIRU’. Later, Baily also adopted ‘natural rate’ in the same contexts as did others – e.g. Baily, Burtless, et al. (1983).

¹⁹ Spindler and Maki were both primarily associated with Simon Fraser University, though writing about Britain. Their treatment of ‘the natural rate’ obviously conforms to what we describe as the typical usage of ‘NAIRU’, though they were writing before that term came into wide circulation.

²⁰ They used the term ‘natural unemployment rate’, which we consider completely interchangeable with ‘natural rate of unemployment.’

²¹ Duck and Zis both taught at British Universities and were of a broadly ‘Friedmanite’ persuasion in believing inflation was arising from unemployment being held too low.

their work, for example by [Trevithick \(1979, p. 150\)](#), reviewing [Parkin and Sumner \(1978\)](#). He said the book concentrated on ‘refining and defending a basically monetarist model – excess monetary expansion raises aggregated demand, reduces unemployment below its natural rate, and stokes up inflationary expectations.’ In general, though, economists contributing to British journals appear not to have had much interest in the concept of the natural rate and were more sceptical about it than were their American counterparts.²²

In the continental European journals, the picture is slightly more mixed, although there seem to be only about a dozen usages of the term. In the *European Economic Review*, the term ‘natural rate of unemployment’ appears only twice during the 1970s. [Axelsson and Löfgren \(1977\)](#), discussing search unemployment in Sweden, noted that it was Friedman’s terminology, perhaps enabling its authors to use the term while distancing themselves from it. [Holden and Peel \(1977\)](#) were, like much of the American literature, explicitly testing propositions from Friedman. In other journals the expression appeared only occasionally, nearly always as a brief mention and nearly always connected to Friedman’s thinking. So, for example, [Siven \(1972\)](#) and [Hoel \(1979\)](#) saw the ‘natural rate’ as arising from the satisfaction of inflation expectations. And [Harcourt \(1977\)](#) in effect treated it the same way, though making no secret of his aversion to the idea.

As for the ‘NAIRU’, that label goes essentially unused in Europe in the 1970s (see [Fig. 3](#)). In *The Economic Journal*, the *National Institute Economic Review*, *Economica*, and *Oxford Economic Papers* the only reference is in a paper by Willem [Buiter \(1978\)](#) who was a Tobin student, then based in the United States.²³ Similarly, in the European journals during the 1970s: there were no instances in *Weltwirtschaftliches Archiv*, *Revue d’économie politique*, *The Scandinavian Journal of Economics*, the *European Economic Review* or *Kyklos*.

Thus whether we look at the British or the continental European literature in the 1970s, there was practically no use of the term ‘NAIRU’, and the usage of ‘the natural rate’ was mostly disapproving or neutral, with the important exception of the work by the British monetarists. Dissent from the terminology did not, however, tend to indicate any significant theoretical divide as to what the words meant, merely a distancing from the associations the word ‘natural’.

3. Understanding the inflation-unemployment trade-off: the Volcker shock and after

The distinct trajectory of the usage of terms becomes notable towards the end of the 1970s and during the 1980s. [Fig. 3](#) tracks the use of terms by decade in European and American journals, with definitions given in the Appendix. While there was no ‘NAIRU’ use in European journals until the 1980s, its use was substantially greater than that in American journals. In the United States, due to the policies of Paul Volcker, who became Chairman of the Federal Reserve in 1979, inflation was reduced sharply after 1982 and, in contrast with what happened in Europe, unemployment quickly fell. This experience could readily be understood within the Phillips curve framework and the accelerationist hypothesis.

During this period the term ‘NAIRU’ was increasingly used outside the Brookings Institution, especially by economists at Yale, who had been educated at MIT, though at the end of the 1970s and during the 1980s, uses were still few. However, there was also a considerable variety in the way the term was used.²⁴ Some, like [Tobin \(1980\)](#) and [Gordon \(1989\)](#), used it apparently interchangeably with ‘NRU’. [Nordhaus \(1980, p. 359\)](#) said he used the expression ‘natural rate’ as a shorter version of ‘NAIRU’. Others seem to have had some distinction in mind. For example, [Fellner \(1980\)](#), like [Summers and Blinder \(1986\)](#), used the term ‘NAIRU’ descriptively when his focus was on precisely the level of unemployment at which inflation was stable. [Seidman \(1981\)](#) used it as a synonym for ‘natural rate’, but evidently preferred ‘NAIRU’. Similarly [Nichols \(1983\)](#) and [Davenport \(1983\)](#) used it as an alternative label. [Sachs \(1983\)](#) used the term once to describe the minimum feasible level of unemployment. [Blanchard and Summers \(1988b\)](#) discussed a variety of hysteresis-type effects, and clearly saw them as contradicting the ‘natural rate hypothesis’ which they understood as suggesting an unchanging equilibrium. From our point of view, the most interesting part of their argument is that when (in their footnote 2) they mentioned formal estimates of the rate – but only then – they called them estimates of the NAIRU, not the natural rate. David [Gordon \(1988\)](#) did a similar thing, discussing theory mainly in terms of the natural rate, and estimates of the crucial rate of unemployment in terms of the ‘NAIRU’.

There were economists who tried to distinguish between two concepts of what we might loosely call ‘equilibrium unemployment’. [McCallum \(1981, p. 134-5\)](#) appears to distinguish the ‘natural rate hypothesis’ from the ‘NAIRU concept’ on the basis that the former denied that unemployment could be permanently affected by any price path, whereas the latter permitted the possibility of an accelerating inflation maintaining low unemployment. [Solow \(1986, p. S30\)](#) was more explicit in making such a distinction, saying,

In practical terms, the ‘natural rate’ these days figures in two ways. It might appear as a NAIRU, an unemployment rate below which the economy can not stay without accelerating inflation. Or – in models that contain an ‘expected inflation’ or ‘inertial

²² Examples of American discussions of the natural rate that are more substantial and more sympathetic to the notion than those of British authors include [Rees \(1970\)](#), who was arguing for the possibility of an enduring ‘Phillips curve’ tradeoff; [Turnovsky \(1972\)](#), testing the expectations hypothesis with Canadian data; [Donner and Lazar \(1973\)](#), arguing about the existence of a natural rate; [Scarfe \(1973\)](#) was a theoretical paper written by a Canada-based author which mentioned the natural rate in a footnote as a theoretical possibility; [Davidson and Weintraub \(1973\)](#); [Wachter \(1974\)](#) who, taking a theoretical shortcut, defined it to mean the same as ‘full employment’; [Kingston and Turnovsky \(1978\)](#); [Phelps \(1978\)](#); and [Buiter \(1978\)](#).

²³ Tobin had been his PhD adviser. The next use of the term ‘NAIRU’ in European journals was [Matthews \(1981\)](#) who used it to say that Tobin had suggested it was of no analytical use. Given that Tobin had referred to the ‘natural rate’ and the NAIRU interchangeably, Matthews may have been avoiding Friedman’s terminology.

²⁴ Tobin, who coined the term, was at Yale, as were Nordhaus, and Fellner. Nordhaus, Gordon, Blinder, and Blanchard had PhD’s from MIT. Summers was an MIT undergraduate before obtaining a PhD from Harvard.

inflation' term on the right-hand side with a coefficient of unity – it occurs as the unemployment rate compatible with a rate of inflation that does not deviate from the expected or inertial rate.

Solow immediately went on to assert that the NAIRU was consistent with (but did not entail) a downward sloping Phillips curve with a vertical asymptote, or with the vertical long-run Phillips curve associated with the natural rate. The difficulty with this is that it is not clear that there is a basis for it in the way the label was used, and to the extent that there was, it is hard to see that other authors thought this the crucial point about the 'NAIRU'.²⁵

Fig. 3 suggests that the expression 'natural rate' however, was more widely used in the American literature than either it was in the European literature or than the 'NAIRU' was used in the American. And 'NAIRU' was more commonly used in European journals than in American. Phelps (1978) explained the idea thus: 'The equilibrium rate – the rate at which the actual inflation rate equals the prevailing expected inflation rate – is hypothesized to be independent of the expected inflation rate and is called the natural rate of unemployment'. Gordon (1978) similarly used the expression precisely in considering what stabilization policy can achieve. At the end of the 1970s and early in the 1980s, a good part of the reason for that was that the idea of the 'natural rate' came to be paired with the idea of rational expectations. These discussions, like so many discussions during the 1970s, had the question of the relationship of the rate of inflation and the level of unemployment at their heart. Early examples include Canzoneri (1978), Mishkin (1978) and Perry (1978).

Sometimes the word 'natural' continued to appear in quotation marks, which may have been to suggest disapproval of the language (e.g. Ashenfelter and Ham (1979), Stiglitz and Weiss (1981, p. 393).²⁶ Blinder (1981, p. 37) went further, referring to 'the so-called "natural rate" of unemployment'. Similarly, Anderson, Ando, and Enzler (1984, p. 55) made mention of the natural rate and said 'which we prefer to call by the more neutral name "nonaccelerating rate" of unemployment (NARU)'. Such points, of course, indicates that the authors in question saw no genuine theoretical difference between the two ideas. The matter was overtly one of choice of terminology. The fact that some held such reservations, however, did not prevent others – or the same people, on other occasions – adopting the terminology of the natural rate, even if they might have been expected to be hostile to Friedman. Alan Blinder (Blinder and Bartel (1984, p. 31)), in an interview about the importance of Keynesian ideas, said that he had argued that in order to control inflation, 'we should nudge the economy along a path with the unemployment rate a little bit above the natural rate'. Broad acceptance of the term is also, presumably, indicated by the use of adaptation of it to things such as the 'natural rate of output' by Begg (1980) or Reuber (1981) and Nelson (1981) or of the output gap by Sachs (1980, p. 84).

This does not mean, of course, the theory was unquestioned. However, the main policy questions posed by American experience could be tackled without a major revision of the theory. For example, David Gordon (1987), even though he challenged the theory of the natural rate, incorporating into it cost-push and institutionalist variables, accepted the logic, and apparently the terminology, of the accelerationist theory. Similar remarks could be made about Blanchard and Summers (1988a). Discussion of the natural rate continued to focus on the relationship between inflation and unemployment, not on what determined the rate of unemployment at which inflation would be stable. In contrast, in Europe, that was to become the key question.

4. The NAIRU and the emergence of a distinctively European approach to unemployment in the 1980s

4.1. Early development of a European approach to NAIRU

During the 1980s, the earliest references to the NAIRU in the academic literature by European economists treat it as synonymous with the natural rate. Miller (1981, p. 48) described it as a more "precise" description of the natural rate, while Worswick (1981, p. 14) noted that some economists used the term as a synonym for the natural rate. However, in Europe, there was a widespread belief, not echoed in the United States, that supply side interventions had worsened the unemployment problem. For example, the term 'Euro-sclerosis' was coined as a label for the consequences of welfare provisions and labour market regulations that were believed by some economists to prevent labour markets from working in a competitive manner.²⁷ Such concerns provided a motivation for European economists to provide a rigorous analysis of supply-side influences on the rate of unemployment that was not present on the other side of the Atlantic. For economists trying to do this, the term 'NAIRU' proved useful.

This usage appears to have come to prominence with a paper by Grubb, Jackman, and Layard (1982), presented at a Conference held in Cambridge in July 1981, and which marked the beginning of a long programme of research, centred on the London School of Economics (LSE), on the problem of unemployment involving economists from many countries.²⁸ In the published Conference proceedings it was the only paper to use the term 'NAIRU'. It is a landmark paper because they endogenize the NAIRU using a model of

²⁵ Solow was exercised about the question of whether unemployment above the natural rate would result in accelerating disinflation – he noted the implausibility of that in 1986 (p. S31). As noted above, Modigliani had made a similar point, but coined new terminology to deal with it.

²⁶ It is, of course, possible that this was at the insistence of journal editors. Greenspan (1993) is a later example.

²⁷ The Oxford English Dictionary gives the first usage of the word as being in a Herbert Giersch article in *Time* in 1984.

²⁸ Richard Layard is a labour economist, who first studied History at Cambridge, before studying economics at the LSE. Alongside his work on the determination of unemployment in the 1980s, he was involved in founding the Centre for Economic Performance at the London School of Economics in 1974, and went on to the Employment Institute in 1985, and chaired the European Commission's Macroeconomic Policy Group during the 1980s. Richard Jackman, studied economics at Cambridge and worked extensively on unemployment and labour market policy, including in policy during the 1990s (ILO and World Bank) David Grubb and Richard Jackman were also at LSE. While not a perfect measure of prominence, this article was cited 173 and 39 times in Google Scholar and Web of Science SSCI respectively.

wage bargaining that was to become influential in discussions of European unemployment during the 1980s. They made the NAIRU a function of the target growth rate of real wages, productivity growth and the rise in import prices (Grubb, Jackman and Layard 1982, p. 709, equation 3). This was crucial to their explanation of stagflation, the topic of the conference:

The basic point is that the level of unemployment consistent with stable inflation (NAIRU) has risen. This is what we mean by stagflation. ... the prime source of difficulty is that people are *trying* to achieve too high real wages ... and the fact that real wages become too high is a consequence rather than a prime cause of the difficulty (Grubb, Jackman, and Layard (1982, p. 707).

They were going beyond the claim that microeconomic factors can change the equilibrium rate, in that they provided a theory relating it to macroeconomic variables. Their paper does not mention unions or bargaining, but other papers they and their LSE colleagues were writing at this time did so (see Jackman and Layard (1982), and references cited there).

Another paper at that conference, by Andrews and Nickell (1982), also at LSE, did discuss such issues, their paper testing both competitive and non-competitive models, concluding that the former did not fit the data. Like the paper by Grubb, Jackman and Layard, a comparison they made, they assumed that the equilibrium rate of unemployment would change, but unlike them, they referred to it as the “natural rate of unemployment” (Andrews and Nickell 1982, p. 739). In contrast, a month later, at the Royal Economic Society (RES) Conference, of four papers on the determination of unemployment, Nickell’s paper was the only one to use the terminology of the NAIRU, defined as the rate of unemployment at which not only inflation and expected inflation, but also inflation in world prices, were the same (Nickell (1982, p. 54).²⁹ The RES conference was, of course, dominated by British economists, but the significance of the topic for continental European economists was signaled by the presence of Malinvaud, Director of INSEE in Paris, and a central figure in the French economics (see Plassard and Renault, this issue). He explicitly analysed the problem in terms of a ‘political conflict’ over real incomes (Nickell 1982, p. 55). Other contributors to the symposium (Robert Gordon, Edmond Malinvaud and Anthony Atkinson), chose to analyse the relationship between real wages, productivity and unemployment without bringing in inflation, which was Nickell’s approach in another paper published shortly afterwards (Nickell and Andrews (1983)). Thus, although the inflation-unemployment relationship, and hence the NAIRU, was being analysed in terms of the relationship between real wage and productivity growth, the same economists could analyse the latter independently of inflation. Though the terminology they used was still evolving, contributors to these two symposia were looking for new theoretical explanations of the level of unemployment, a very different emphasis from that found in the American literature, with its focus on the trade-off between inflation and unemployment.

The term ‘NAIRU’ was also used in the course of attempts to develop a new theory of the level of unemployment in the *European Economic Review*, in two papers previously presented at a conference at Mannheim in July 1982. Both papers are concerned with the link between productivity and real-wage growth and unemployment, thereby explaining the longer-term factors affecting unemployment. One paper – Grubb, Jackman, and Layard (1983) – used the framework to try to operationalise the distinction between nominal and real wage rigidity. The other focused on Germany, assessing how far shocks such as the oil price explosion and the productivity slowdown had affected unemployment: ‘macroeconomic policy may not be able to make oil cheaper, but can try to mitigate adverse secondary effects on aggregate output and employment’ (Franz (1983, p. 51)). Franz estimated a model where the NAIRU depended on material and unit capital costs and calculated the ‘no shock NAIRU’ at which there were no shocks to either of these variables. He provided a careful explanation of his reason for using this terminology: ‘The label “natural” rate of unemployment, however, has been frequently misunderstood (especially outside the economics profession), since there is nothing “natural” to this rate. That level of unemployment is subject either to a better designed demand strategy or to other policy measures’ (Franz (1983), p. 53).

These uses of ‘the NAIRU’, like most others in the *European Economic Review* later in the 1980s, conform to the pattern identified earlier, of adopting the terminology where the aim is to explore the significance of longer-term, supply-side factors (later papers include Hughes and McCormick (1987) (UK); Sneessens (1987) (Belgium); Tullio (1987) (Italian, in the European Commission), and Hoel and Nymoer (1988) (Norway).³⁰ Hoel and Nymoer, who were arguing that a more elaborate structural model, as opposed to a single-equation Phillips curve, was needed to explain Norwegian inflation, specifically compared their model to the approach of Layard and Nickell, to which we now return.

4.2. The 1985 *Economica* special issue

Another conference motivated by the problem of high European unemployment in the 1980s—high-profile on account of its being funded by the Commission of the European Communities, the Economic and Social Research Council, the Department of Employment, and the UK Treasury, as well as because of the eminence and variety of participants—was held in 1985, and resulted in a special issue of *Economica*. This was another important milestone. In a keynote address concerned solely with ‘Getting the questions right,’ Solow (1986, p. S24), as well as pointing out the ambiguous meaning of the term ‘NAIRU’ that was discussed in Section 3 above, argued that the usual ‘casual’ interpretation of ‘natural rate of unemployment’ had ‘very little basis either in theory or in data analysis’. He

²⁹ Nickell studied Mathematics at Cambridge before continuing his career in economics at the LSE and then Nuffield College, Oxford. He was actively involved in policy affairs, such as the Bank of England Monetary Policy Committee and, later, the UK Budget Responsibility Committee, was an econometrician initially at LSE, who during the 1970s focused increasingly on the labour market. He moved to Oxford in 1984.

³⁰ Sneesens was Dreze’s PhD student, and a key protagonist in the development of the Franco-Belgian axis of general equilibrium models with rationing discussed in Plassard and Renault (this issue).

suggested that this meant that the NAIRU was conceptually not necessarily the same as the natural rate.³¹ However, though he called for a sounder theoretical basis for the concept, he left that task to others.

The conference organizers and the editors of the resulting *Economica* special issue (Charles Bean, Richard Layard and Stephen Nickell) framed the task of the conference not in terms of the Phillips curve but in terms of circumventing the impasse reached between Keynesian and ‘classical’ explanations of unemployment that had dominated the debate over unemployment until then.³² This was consistent with the composition of the participants, most of whom were from continental Europe.³³ This special issue and work, particularly by Layard and Nickell which followed came to be very highly cited.³⁴ Given that these concepts were associated with the literature on disequilibrium theory, to which Francophone economics were the main contributors, this could be seen as a ‘European’ framing of the problem. Furthermore, as with work mentioned earlier in this section, it related not to the inflation-unemployment trade-off but to determining factors behind the level of unemployment. Bean, Layard and Nickell argued that both the concepts of ‘Keynesian’ and ‘classical’ unemployment rested on assumptions of perfect competition.³⁵ In contrast, introducing the notion of imperfect competition, which they argued might arise from a variety of models, such as efficiency wages, they established a natural level of equilibrium demand ‘as well as a “natural” level of unemployment, or NAIRU’ (Bean, Layard, and Nickell, 1986, p. 15). In this volume, the Layard and Nickell model is a small structural macroeconomic model of aggregate demand and supply, where the supply side of the economy depends on a price setting function, as well as equilibrium in the labour market, making a variety of assumptions about wage setting. These include efficiency wages, lower quitting rates, fewer vacancies, or increase in work effort, they depart from perfect competition wage setting. In this respect, the prevalence of the cost-push explanation of inflation discussed in Section 2 developed into the work by Layard et al. and their efforts to figure out quantitatively the determinants of the NAIRU.

The Bean, Layard and Nickell (1986) multi-country study rests on the study of the UK by Layard and Nickell (1986) on which Dolado, Molina, and Zabalza (1986) and Modigliani, Schioppa, and Rossi (1986) also rely for their studies of Spain and Italy respectively. Dolado and his coauthors concluded, that as actual levels of unemployment were close to the NAIRU, any efforts to reduce unemployment through expansionary demand policies would lead to higher inflation, and hence propose policies to reduce the NAIRU, such as greater labour market flexibility and incomes policy. Although the authors recognize the resemblance of their models to the models of Friedman and Lucas, they differ in that they do not rely on exogenous factors for the natural rate but rather on endogenous determined variables, such as wages, determined by search costs, and efficiency wages. Again, the term ‘NAIRU’ is used when economists are inquiring into what determines the inflation-safe level of unemployment.

Like their British counterparts, prominent French and Belgian economists also took the view that single-equation Phillips curve was inadequate to explain inflation and unemployment, and that a more elaborate structural model was needed, leading them to use ‘the NAIRU’ or very similar terms. Malinvaud reviewed a broad range of institutional factors relevant to French unemployment and distanced himself from the view that malfunctions in the system of relative wages and prices were to blame for high unemployment. He was explicit in rejecting Friedman’s approach: ‘Fitting Phillips curves tells nothing in itself about the causes or even the measure of this unemployment. Indeed, there is no compelling reason for accepting the identification, proposed by M. Friedman, of the frictional unemployment rate with the NAIRU’ (Malinvaud, 1986, p. S214).³⁶ In their paper on Belgium, in which they derived a quantity rationing model, Sneessens and Drèze referred to neither the NRU or NAIRU but rather to the NIRU,³⁷ the non-inflationary rate of unemployment (NIRU) or at times the NIREL, ‘Non-Inflationary Rate of Excess Demand’. However, they were cautious in interpreting what they viewed as a ‘traditional’ concept, for they argued that it was important to take into account the endogeneity of potential output. Given that scrapping and investment decisions depended on expectations of future demand, even ‘classical unemployment,’ commonly seen as the result of a high real wage rate, might be ‘the consequence of an effective demand problem’ (Sneessens and Drèze, 1986, p. S118)).³⁸

The definitive account of the Layard-Nickell approach to the NAIRU, which is found in many of these papers, was later provided in *Unemployment: Macroeconomic Performance and the Labour Market* (Layard, Nickell, and Jackman, 1991). Coverage of all aspects of the labour market—bargaining and wage determination, firms’ pricing behaviour, unemployment duration, the structure of

³¹ His argument was similar to that used by Modigliani and Papademos, discussed in footnote 2.

³² Charles Bean is a British economist, trained in Economics and Maths at Cambridge, followed by MIT, with a career at the LSE. He held notable positions in policy such as Executive Director, Chief Economist and Deputy Governor of the Bank of England.

³³ Leaving aside papers framing the conference by the editors and an overview of OECD unemployment by Michael Bruno, case studies covered Austria, Belgium, France, Germany, Italy, Great Britain, Italy, the Netherlands and Spain, with non-European studies being confined to Australia, Japan and a comparison of the United States and Canada.

³⁴ The Introduction was cited more than 500 times and the Layard and Nickell article over 1000 times in Google Scholar. Nickell, overall, a highly cited author, has total citations in Web of Science’s SSCI of 2501, and many times that in Google Scholar.

³⁵ In the literature on ‘disequilibrium macroeconomics,’ the term classical unemployment was used to denote a situation where excess supply in the labour market was accompanied by excess demand in the goods market; and Keynesian unemployment a situation in which there was excess supply in both markets.

³⁶ Malinvaud’s contribution to the theory of unemployment in his 1977 ‘Unemployment reconsidered’ was an extremely highly cited contribution (2064 citations in Google Scholar). Malinvaud is discussed extensively in Plassard and Renault (this issue).

³⁷ That was terminology previously used by Modigliani and Papademos, though the coinage of Sneessens and Drèze seems to be independent.

³⁸ Drèze was a Belgian mathematical economist, trained at the University of Liege, and Columbia university, with significant contributions in theory, econometrics and policy. He was instrumental in establishing CORE at Louvain and the first President of the European Economic Association in 1986. Sneessens was trained at Louvain and spent the majority of his career at a number of European universities (LSE, Université Catholique de Lille, Université Catholique de Louvain and University of Luxembourg).

unemployment—culminated in a macroeconomic model in which, echoing Franz's earlier distinction between the NAIRU and the 'no shock NAIRU', they analysed macroeconomic performance in terms of short-run and long-run NAIRUs. This is a significant point because, at least in this literature aimed at explaining European unemployment problems in the 1980s, the NAIRU had become tied to a specific approach, centred on general equilibrium macroeconomic models in which close attention was being paid to the development of alternative microfoundations, whether rooted in bargaining and imperfect competition or in disequilibrium.

The development of disequilibrium macroeconomics made by Europeans was significant in respect to the study of unemployment. The work of Bean, Layard, Nickell, and Jackman evolved into a more formal framework. The interest was in the macroeconomic implications of the NAIRU in the presence of persistent European unemployment. Though distinct from the earlier literature, it can be seen as a successor to earlier efforts by general equilibrium theorists, such as [Malinvaud \(1977\)](#), who sought to provide a theory of involuntary unemployment based on microeconomic foundations without referencing the natural rate. What these approaches had in common was providing a general equilibrium model with microeconomic foundations that explained the level of unemployment beyond the very short run. Neither of these approaches ever took off in the United States where the unemployment problem was conceived differently.³⁹

Although their use of the term 'NAIRU' may have had the effect of distancing their work from Friedman's theory, Layard, Nickell and their co-authors could be seen developing his account of the natural rate:

The 'natural rate of unemployment,' in other words, is the level that would be ground out by the Walrasian system of general equilibrium equations, provided there is imbedded in them the actual structural characteristics of the labor and commodity markets, including market imperfections, stochastic variability in demands and supplies, the cost of gathering information about job vacancies and labor availabilities, the costs of mobility, and so on ([Friedman, 1968](#), p. 8).

Of course, they took the need to specifically investigate market imperfections much more seriously than Friedman did. The difference in terminology associated with the different enquiries seems clear. Their work was more closely connected to the broader effort to provide micro foundations to unemployment, such as the work by Mortensen and Pissarides, than to the literature on the inflation-unemployment trade-off with which the term natural rate had come to be associated. Although it was a label for what was arguably the same concept, the term 'NAIRU' clearly became part of a distinct line of macroeconomic research from that with which the term 'natural rate' was associated: it was part of a distinctively European approach to macroeconomics, framed by the problems besetting Europe.

In this period, usage of the terms 'NRU' and 'NAIRU' in the continental European journals (which included some articles by British economists) suggests that any distinction between the two terms was disappearing. However, it still conforms well to the general picture of discussion of 'the NRU' being used in discussion of a trade-off between inflation and unemployment and theoretical discussion of its determinants, while 'the NAIRU' was concerned with empirical investigation of the inflation-safe level of unemployment. [Löfgren \(1981\)](#) discussed the natural rate in Friedmanite terms, whilst reviewing a book that was itself concerned with the analysis of the idea of the natural rate. [Oswald \(1985\)](#) on the other hand, wrote of the 'natural rate' as an equilibrium, but offered 'NAIRU' as an alternative name. [Driffill \(1985\)](#) took the opposite course, noting the idea of the 'NAIRU' as emerging from the work of Layard, Nickell, and others, and said that strong unions were often said to increase it. But in his own model of unions, the equilibrium rate of unemployment was labelled 'natural' without comment on the terminology (p. 304). Many others used the label 'natural' in a way akin to Friedman.⁴⁰ Amongst others using the label 'NAIRU', there were a good number who said nothing that might distinguish it from the NRU, but also those who discussed bargaining processes setting wages above market clearing levels.⁴¹ There were very occasional attempts actually to distinguish the two ideas, such as when [Blomqvist \(1988\)](#), based in Helsinki, briefly distinguished the two concepts on the basis that the NAIRU was a broader idea, being the unemployment rate compatible with any stable rate of inflation (he did not say why he thought this was not true of the NRU). On the other hand, two other Scandinavian economists, [Lindbeck \(1989\)](#) and [Paldam \(1989\)](#), clearly treated them as interchangeable.

5. Convergence: the 1990s

By the 1990s, persistent high unemployment was no longer the issue facing Europe: German reunification provided a large fiscal stimulus, and the creation of the single European market provided opportunities for growth. The creation of the Euro presented major adjustment problems for some countries, resulting in very high unemployment, notably in Southern Europe, but this was distinct from the Europe-wide stagnation that dominated macroeconomic analysis during the previous decade. Leaving aside such issues, business cycles in both continents were mild and that the decade became known as the start of a 'great moderation'. As shown in [Fig. 2](#), the usage of both terms declined substantially thereafter.

The publication of Layard, Nickell and Jackman's (1991) book solidified their approach as both incorporating a concern for classical long-run determination of unemployment, as well as incorporating the importance of demand. Widely cited, this book was recognised as the 'most distinctive contribution' to macroeconomics by [Cross \(1993\)](#) and as the 'culmination of a major research

³⁹ This lack of American interest in these approaches contrasts with the greater interest in partial-equilibrium search theories, not focused on the Phillips curve, associated with Peter Diamond, Dale Mortensen and Christopher Pissarides.

⁴⁰ For example, [Blejer and Leiderman \(1982\)](#), and [Ahmad \(1984\)](#).

⁴¹ For example, [Steigum \(1987\)](#), [Ström \(1989\)](#) and [Blomqvist \(1988\)](#).

programme on unemployment' (Harrigan et al., 1993).⁴² Its ideas became integrated into teaching textbooks, for instance in Carlin and Soskice (1990) and, as noted by Turner (1991), a version of the Layard-Nickell model was the basis of the large macroeconomic model of the UK economy by HM Treasury.

In addition to a change in policy concerns, debate over the terms of a short-run Phillips curve declined and attention generally focussed on the supply-side questions of how to improve labour market performance. In these circumstances, and with nothing powerful to keep them distinct, usage of the terms 'NRU' and 'NAIRU' became less distinct. A clear illustration of this change comes in a symposium in the *Journal of Economic Perspectives* in 1997 titled 'The natural rate of unemployment.' This symposium reflects an array of outstanding issues in the study of unemployment and inflation, about which the term 'NAIRU' is used interchangeably with the 'natural rate' by both supporters and critics respectively, for example, Greenspan (1993), and Galbraith (1997).⁴³ The symposium began with 'Reflections on the natural rate hypothesis' in which Stiglitz (1997) began his contribution with the words, 'Few concepts in economics with an acronym as unpleasant as NAIRU have attained as much public prominence in the past 10 years'. For him, 'NAIRU' was simply a name for the natural rate of unemployment, which was useful in its predictive ability of inflation, and about which useful explanations exist, despite there being 'considerable uncertainty about its exact magnitude' and despite the fact that 'no one knows exactly where the NAIRU is' (p.10). In the next paper, Gordon (1997) seemed to think that there had been a change in terminology in the few years after Friedman's Presidential Address, but he attached no special significance to this. In a paper aimed at estimating the crucial level of unemployment, Staiger, Stock, and Watson (1997) wrote only of the NAIRU, notwithstanding the title of the symposium. Blanchard and Katz (1997), in an analysis of the determinants of equilibrium unemployment in terms of wage bargaining, productivity growth and labour market rigidities, chose to use the term 'natural rate of unemployment' spurning the term 'NAIRU' with which such analyses had come to be associated a decade earlier. One might have thought that James Galbraith (1997) would have wanted to attack the NRU, with its connotations of normality, but he used the two terms interchangeably, but chose to argue that the concept of the NAIRU should be abandoned. But from his point of view, the entire concept, and not merely the claim that any unemployment rate was 'natural', arose from mistaken analysis.

In contrast, Richard Rogerson (1997, p. 84) did try to distinguish between different concepts of unemployment (equilibrium unemployment, deterministic steady state unemployment and efficient unemployment) but he nonetheless argued that all previous terminology was imprecise and corresponded to none of these concepts. By this time, then, it seems that even the partial distinction between the two terms that had existed was gone. Elsewhere, Mangum et al. (1995), far from attempting to draw a conceptual distinction between the two ideas, managed to say that the term 'natural rate' had replaced 'NAIRU'. Thereafter, although authors would sometimes make assertions about the difference in meaning between them, it is hard to see any real pattern in the significance that is accorded to the two labels. It seems likely that, as the issues that had motivated the use of different terminology became less prominent, the choice of terminology became more random; it ceased to have any significance at all.

6. Conclusions

The idea and the terminology of the 'natural rate' came to prominence in the context of rising inflation and unemployment and was initially associated with investigation of the relationship between those two variables. The 'natural rate hypothesis' as Tobin (1972) called it, was the view that there was no enduring relationship between inflation and unemployment, or no 'trade-off' as it is sometimes put. In 1976 he introduced the terminology of the NAIRU, but it was little used at that time. It was only when economists switched to asking questions about what determined the equilibrium level of unemployment – as they did primarily in Europe – that the terminology of the NAIRU became established.

The situation was different in Europe. Given the significantly more important role of unions, bargaining theories of unemployment and inflation, implying imperfect competition, had been taken more seriously than in the United States. In the 1980s, as European unemployment experience differed more sharply from American, the difference between the questions asked in the two continents became more marked, resulting in greater divergence in the terminology used. General equilibrium models of unemployment based on imperfect competition and bargaining came to be associated with the term NAIRU. A Phillips-curve trade-off between inflation and unemployment was often part of those models, but it was not their central feature. The NAIRU came, because of these very specific circumstances, to be used in a way that distinguished it from the way Americans generally used the concept of the natural rate of unemployment. There was never any systematic difference in the concepts referred to by the terms NRU and NAIRU, as is shown by the willingness of some authors to switch between terms shows that rather clearly. Despite their role in promoting models of the NAIRU, Layard and Nickell (1986) wrote about the 'natural rate', and Johnson and Layard (1986) wrote a whole chapter entitled 'The natural rate of unemployment: Explanation and policy'.⁴⁴ By the 1990s, the macroeconomic experiences of Europe and the United States no longer diverged in the same way, with the result that there was less need for a distinctive theory of unemployment tailored to the policy questions facing Europe. Attention shifted to other problems with the result that the distinction between the natural rate and the NAIRU, which for a brief period had served as an indicator of a distinctive European approach to the problem of inflation and unemployment, became muddled once again.

⁴² According to Google Scholar, the book has been cited 7408 times.

⁴³ Both articles are widely cited, with Stiglitz' article being cited 651 times in Google Scholar and Galbraith's, 400 times. Gordon's article was the most cited of the symposium (at 1443 times according to Google Scholar), Staiger, Stock, and Watson (1997) at 868 times, Blanchard and Katz (1997) 952 times, and Rogerson's 166 times.

⁴⁴ Here, the thought that the title arose from editorial insistence lacks purchase, since Layard was one of the volume editors.

This paper has, we hope, achieved two tasks. One is to account for the complex evolution of two terms used to describe essentially the same phenomenon. It is about the way the use of language is related to the purposes for which theories are being used even when different terminology is not related in any precise way to different concepts. The natural rate and the NAIRU are sufficiently similar that for many economists they are synonyms. This explains why there was never any significant debate over which was the appropriate term to use. And yet, as we hope we have demonstrated, it is possible to discern a connection between the problems economists tackled and the terminology they chose to use; the connection is not perfect, but it is there. The other task is to take stock of a distinctively European literature that was a development from the literature on disequilibrium macroeconomics but distinct from it. Using models of imperfect competition and wage bargaining to explain the NAIRU was a distinctively European activity that never took off in the United States.

Data availability

Data will be made available on request.

Acknowledgement

We are grateful for valuable comments provided by the participants of the workshop held in January 2022, the comments and feedback of referees, editors, Ourania Dimakou and Dimitrios Tsomocos.

Appendix: The frequency with which terms are used

Figs. 2 and 3 contain the results of searches of JSTOR using Constellate, augmented with data on the EER from ScienceDirect and Kyklos. JSTOR lists 185 Journals in Economics, among which European Economic Review and Kyklos are not included. We chose Kyklos to add an economics journals with a European focus that publishes in English. Kyklos is over seventy years old, and attached to the Faculty of Business and Economics at the University of Basel. The other journals were chosen on the grounds that they included the main ‘general’ (English-language) journals (for Europe), as well as specialist policy-oriented journals.

The following abbreviations define the precise JSTOR searches performed on March 20th, 2023:

NRU – “NRU” OR “natural rate of unemployment” OR “natural unemployment rate”

NAIRU – “NAIRU” OR “non-accelerating inflation rate of unemployment”

Total – Articles, chapters and books in JSTOR

10US – Brookings Papers on Economic Activity, Eastern Economic Journal, Journal of Economic Literature, Journal of Money, Credit and Banking, Journal of Political Economy, NBER Macroeconomics Annual, Southern Economic Journal, The American Economic Review, The Journal of Economic Perspectives, The Quarterly Journal of Economics

10EUR – Economic Journal, *Economica*, Oxford Economic Papers, Economic Policy, Oxford Review of Economic Policy, Cambridge Journal of Economics European Economic Review, Kyklos, Scandinavian Journal of Economics, *Weltwirtschaftliches Archiv*

JSTOR searches were confined to articles, chapters and books, and ScienceDirect searches to research articles, discussions and editorials. The period chosen is 1960 to 2019, in the subject field of ‘Economics’. For both terms in JSTOR, the search excluded table of contents, back and front matter, and miscellaneous document sub-type.

This data is subject to many limitations, including JSTOR coverage, imperfections in OCR software, and idiosyncratic spelling of terms for which we have searched, but several conclusions emerge clearly. Note that papers may cite both terms. For these reasons, at the very least, the Figures are no more than illustrative.

References

- Ahmad, J., 1984. Inflationary expectations and transmission of inflation under floating exchange rates. *Weltwirtsch Arch.* 120 (3), 424–435.
- Anderson, R., Ando, A., Enzler, J., 1984. Interaction between fiscal and monetary policy and the real rate of interest. *Am. Econ. Rev.* 74 (2), 55–60.
- Andrews, M., Nickell, S.J., 1982. Unemployment in the United Kingdom since the War. *Rev. Econ. Stud.* XLIX, 731–759.
- Ashenfelter, O.C., Ham, J., 1979. Education, unemployment, and earnings. *J. Polit. Econ.* 87 (5), S99–S116.
- Axelsson, R., Löfgren, K.-G., 1977. The demand for labor and search activity in the Swedish labor market. *Eur. Econ. Rev.* 9 (3), 345–359.
- Backhouse, R.E., Boianovsky, M., 2013. *Transforming modern macroeconomics*. Cambridge University Press, New York.
- Baily, M.N., 1976. Contract theory and the moderation of inflation by recession and by controls. *Brook. Papers Econ. Act.* 1976 (3), 585–633.
- Baily, M.N., 1978. Comment on: slowing the wage-price spiral: the macroeconomic view. *Brook. Papers Econ. Act.* 1978 (2), 259–299.
- Baily, M.N., Burtless, G., Lovell, M.R., Lovell, M.R., Semerad, R.D., 1983. Unemployment. *Brookings Rev.* 2 (1), 28–31.
- Baily, M.N., Tobin, J., 1977. Macroeconomic effects of selective public employment and wage subsidies. *Brook. Papers Econ. Act.* 1977 (2), 511–544.
- Bean, C.R., Layard, P.R.G., Nickell, S.J., 1986. The Rise in Unemployment: A Multi-Country Study. *Economica* 53 (210), S1–S22.
- Begg, D.K.H., 1980. Rational expectations and the non-neutrality of systematic monetary policy. *Rev. Econ. Stud.* 47 (2), 293–303.
- Bispham, J.A., 1975. The new cambridge and ‘monetarist’ criticisms of ‘conventional’ economic policy-making. *Natl. Instit. Econ. Rev.* (74), 39–55.
- Blanchard, O., Katz, L.F., 1997. What we know and do not know about the natural rate of unemployment. *J. Econ. Perspect.* 11 (1), 51–72.
- Blanchard, O.J., Summers, L.H., 1988a. Beyond the natural rate hypothesis. *Am. Econ. Rev.* 78 (2), 182–187.
- Blanchard, O.J., Summers, L.H., 1988b. Beyond the natural rate hypothesis. *Am. Econ. Rev.* 78 (2), 182–187.
- Blejer, M.I., Leiderman, L., 1982. Relative-price variability and output-inflation tradeoffs in an open economy. *Weltwirtsch Arch.* 118 (4), 639–650.
- Blinder, A.S., 1981. Monetarism is obsolete. *Chall.* 24 (4), 35–41.
- Blinder, A.S., Bartel, R.D., 1984. A Keynesian restoration is here. *Chall.* 27 (2), 26–34.

- Blomqvist, H.C., 1988. Some problems in estimating the "natural" rate of unemployment from the expectations-augmented Phillips curve. *Scand. J. Econ.* 90 (1), 113–120.
- Budd, A.P., 1975. The debate on fine-tuning: The basic issues. *Natl. Instit. Econ. Rev.* 56–59.
- Buiter, W., 1978. Short-run and long-run effects of external disturbances under a floating exchange rate. *Economica* 45 (179), 251–272.
- Canzoneri, M.B., 1978. The role of monetary and fiscal policy in the new Neoclassical models. *Southern Econ. J.* 44 (3), 642–647.
- Carlin, W., Soskice, D., 1990. *Macroeconomics and the wage bargain*. OUP, Oxford.
- Cross, R.B., 1987. Hysteresis and the instability in the natural rate of unemployment. *Scand. J. Econ.* 89 (1), 71–89.
- Cross, R.B., 1993. The NAIRU as a theory of equilibrium unemployment. *J. Econ. Stud.* 20 (1/2), 116–122.
- Davenport, P., 1983. Unemployment, demand restraint, and endogenous capacity. *Eastern Econ. J.* 9 (3), 258–271.
- Davidson, P., Weintraub, S., 1973. Money as cause and effect. *Econ. J.* 83 (332), 1117–1132.
- Desai, M., 1979. *Econ. J.* 89 (354), 457–458.
- Dolado, J.J., d. Molina, J.L.M., Zabalza, A., 1986. Spanish industrial unemployment: some explanatory factors. *Economica* 53 (210), S313–S374.
- Donner, A.W., Lazar, F., 1973. Some comments on the Canadian Phillips curve. *Economica* 40 (158–207), 195.
- Driffill, J., 1985. Macroeconomic stabilization policy and trade union behaviour as a repeated game. *Scand. J. Econ.* 87 (2), 300–326.
- Duck, N.W., Zis, G., 1979. The natural rate hypothesis, policy rules, and fixed exchange rates'. *Oxf. Econ. Papers* 31 (1), 36–46.
- Fellner, W., 1980. The valid core of rationality hypothesis in the theory of expectations. *J. Money Credit Bank.* 12 (4, Part 2), 763–787.
- Forder, J., 2014. *Macroeconomics and the Phillips curve myth*. OUP, Oxford.
- Forder, J., 2021. Down with high citation counts. *Economia* 11 (3), 461–471.
- Franz, W., 1983. The past decade's natural rate and the dynamics of German unemployment. *Eur. Econ. Rev.* 21 (1), 51–76.
- Friedman, M., 1966. Comments'. In: Schultz, G.P., Aliber, R.Z. (Eds.), *Guidelines, informal controls, and the market place*. Chicago University Press, pp. 55–61.
- Friedman, M., 1968. The role of monetary policy. *Am. Econ. Rev.* LVIII (1), 1–17.
- Galbraith, J.K., 1997. Time to ditch the NAIRU'. *J. Econ. Perspect.* 11 (1), 93–108.
- Gordon, D.M., 1987. Six-percent unemployment ain't natural: demystifying the idea of a rising "natural rate of unemployment". *Soc. Res.* 54 (2), 223–246.
- Gordon, D.M., 1988. The un-natural rate of unemployment: an econometric critique of the NAIRU hypothesis. *Am. Econ. Rev.* 78 (2), 117–123.
- Gordon, R.J., 1970. The recent acceleration of inflation and its lessons for the future. *Brook. Papers Econ. Act.* 1970 (1), 8–41.
- Gordon, R.J., 1977. Can the inflation of the 1970s be explained? *Brook. Papers Econ. Act.* 1977 (1), 253–277.
- Gordon, R.J., 1978. What can stabilization policy achieve? *Am. Econ. Rev.* 68 (2), 335–341.
- Gordon, R.J., 1989. Comment on Shapiro, assessing the federal reserve's measures of capacity utilization. *Brook. Papers Econ. Act.* 1989 (1), 226–236.
- Gordon, R.J., 1997. The time-varying NAIRU and its implications for economic policy. *J. Econ. Perspect.* 11 (1), 11–32.
- Gramlich, E.M., 1979. Macro policy responses to price shocks. *Brook. Papers Econ. Act.* 1979 (3), 132–146.
- Greenspan, A., 1993. The fed aims for price stability. *Chall.* 36 (5), 4–10.
- Grubb, D., Jackman, R., Layard, R.G., 1982. Causes of the current stagflation. *Rev. Econ. Stud.* 49 (5), 707–730.
- Grubb, D., Jackman, R., Layard, R.G., 1983. Wage rigidity and unemployment in OECD countries. *Eur. Econ. Rev.* 21, 11–39.
- Haberler, G., 1974. Inflation as a worldwide phenomenon - overview. *Weltwirtsch. Arch.* 110 (2), 179–193.
- Hall, R.E., 1974. The process of inflation in the labor market. *Brook. Papers Econ. Act.* 1974 (2), 343–393.
- Harcourt, G.C., 1977. The theoretical and social significance of the Cambridge controversies in the theory of capital: An evaluation. *Revue d'économie politique* 87 (2), 351–375.
- Harrigan, F., McGregor, P.G., Swales, K., Ping Yin, Y., 1993. Openness, imperfect competition and the NAIRU'. *J. Econ. Stud.* 20 (1/2).
- Henderson, W., Dudley-Evans, T., Backhouse, R.E., 1993. *Economics and language*. Routledge, London.
- Hines, A.G., 1964. Trade unions and wage inflation in the United Kingdom, 1893–1966'. *Rev. Econ. Stud.* XXXI (4), 221–252.
- Hoel, M., 1979. Rational expectations and rigid wages: A model of inflation and unemployment. *Scand. J. Econ.* 81 (3), 387–399.
- Hoel, M., Nymoer, R., 1988. Wage formation in Norwegian manufacturing. *Eur. Econ. Rev.* 32 (4), 977–997.
- Holden, K., Peel, D.A., 1977. An empirical investigation of inflationary expectations. *Oxf. Bull. Econ. Stat.* 39 (November), 291–299.
- Hughes, G., McCormick, B., 1987. Housing markets, unemployment and labour market flexibility in the UK. *Eur. Econ. Rev.* 31 (3), 615–645.
- Jackman, R., Layard, R.G., 1982. An inflation tax. *Fisc. Stud.* 3 (1), 47–59.
- Jenkinson, T., 1987. The natural rate of unemployment: does it exist? *Oxf. Rev. Econ. Policy* 3 (3), 20–26.
- Johnson, G.E., Layard, P.R.G., 1986. The natural rate of unemployment: explanation and policy. *Handbook of Labor Economics*, v 2. Elsevier, pp. 921–999.
- Kingston, G.H., Turnovsky, S.J., 1978. A small economy in an inflationary world: Monetary and fiscal policies under fixed exchange rates. *Econ. J.* 88 (349), 18–43.
- Laidler, D.E.W., Parkin, M., 1975. Inflation - a survey. *Econ. J.* 85 (December), 741–809.
- Layard, R.G., 1982. Is incomes policy the answer to unemployment. *Economica* 49 (195), 219–239.
- Layard, R.G., Nickell, S.J., 1986. Unemployment in Britain. *Economica* 53 (210), S121–S169.
- Layard, R.G., Nickell, S.J., Jackman, R., 1991. *Unemployment*. OUP, Oxford.
- Lindbeck, A., 1989. Remaining puzzles and neglected issues in macroeconomics. *Scand. J. Econ.* 91 (2), 495–516.
- Lipsey, R.G., 1960. The relation between unemployment and the rate of change of money wage rates in the United Kingdom, 1882–1957: A further analysis. *Economica* 27 (105), 1–31.
- Löfgren, K.-G., 1981. Review of M. Persson, Inflationary expectations and the natural rate hypothesis. *Scand. J. Econ.* 83 (1), 132–135 p. pp.
- Maki, D., Spindler, Z.A., 1975. The effect of unemployment compensation on the rate of unemployment in Great Britain. *Oxf. Econ. Papers* 27 (3).
- Malinvaud, E., 1977. *The theory of unemployment reconsidered*. Blackwell, Oxford.
- Malinvaud, E., 1986. The rise of unemployment in France. *Economica* 53 (210), S197–S217.
- Mangum, G., Jensen, K., Mathews, J., Perkins, D., 1995. What's so natural about the "Natural rate of unemployment. *Chall.* 38 (4), 52–54.
- Matthews, R.C.O., 1981. Comment on the papers by professors Laidler and Tobin. *Econ. J.* 91 (361), 43–48.
- McCallum, B.T., 1981. Monetarist principle and the money stock growth rule. *Am. Econ. Rev.* 71 (2), 134–138.
- Miller, M., 1981. Challenges to demand management. *Fisc. Stud.* 2 (1), 47–57.
- Mishkin, F.S., 1978. Efficient-markets theory: Implications for monetary policy. *Brook. Papers Econ. Act.* 1978 (3), 707–752.
- Modigliani, F., 1986. The debate over stabilization policy. Cambridge University Press, Cambridge.
- Modigliani, F., Papademos, L., 1975. Targets for monetary policy in the coming years. *Brook. Papers Econ. Act.* 1975 (1), 141–165.
- Modigliani, F., Papademos, L., 1978. Optimal demand policies against stagflation. *Weltwirtsch. Arch.* 114 (4), 736–782.
- Modigliani, F., Schioppa, F.P., Rossi, N., 1986. Aggregate Unemployment in Italy, 1960–1983. *Economica* 53 (210), S245–S273.
- National Institute of Economic and Social Research, 1977. Some aspects of the medium-term management of the economy. *Natl. Instit. Econ. Rev.* (79), 38–57.
- Nelson, C.R., 1981. Adjustment lags versus information lags: A test of alternative explanations of the Phillips curve phenomenon. *J. Money Credit Bank.* 13 (1), 1–11.
- Nichols, D.A., 1983. Macroeconomic determinants of wage adjustments in white-collar occupations. *Rev. Econ. Stat.* 65 (2), 203–213.
- Nickell, S.J., 1982. Wages and unemployment: a general framework. *Econ. J.* 92 (365), 51–55.
- Nickell, S.J., Andrews, M., 1983. Trade-unions, real wages and employment in Britain 1951–79'. *Oxf. Econ. Papers-New Series* 35, 183–206.
- Nordhaus, W.D., 1980. Oil and economic performance in industrial countries. *Brook. Papers Econ. Act.* 1980 (2), 341–388.
- Okun, A.M., 1978. Efficient disinflationary policies. *Am. Econ. Rev.* 68 (May), 348–352.
- Organisation for Economic Co-operation and Development, 1990. *Economic Outlook*. vol 1. OECD Publishing, Paris.
- Organisation for Economic Co-operation and Development, 1994. *Jobs Study*. OECD Publishing, Paris.

- Organisation for Economic Co-operation and Development, 1996. Symp. Spec. Chem. Outlook: Is Growth Oppor. Real?, Chem. Innovations Bench Customer, Commod. Chem. Mark.: Is There Still Life?, Chem. Mark. Res. Econ. Chem., Eng. Other Sci. vol 1.
- Oswald, A.J., 1985. The economic theory of trade unions: An introductory survey. *Scand. J. Econ.* 87 (2), 160–193.
- Paldam, M., 1989. A wage structure theory of inflation, industrial conflicts and trade unions. *Scand. J. Econ.* 91 (1), 63–81.
- Parkin, M., 1973. The 1973 report of the President's council of economic advisers: a critique. *Am. Econ. Rev.* 63 (4), 535–545.
- Parkin, M., 1975. The politics of inflation. *Govern. Oppos.* 10, 189–202.
- Parkin, M., Sumner, M.T., 1978. Inflation in the United Kingdom. Manchester University Press, Manchester.
- Parkin, M., Sumner, M.T., Ward, R., 1976. The effects of excess demand, generalized expectations and wage-price controls on wage inflation in the UK: 1956–71. *Carnegie Rochester Confer. Series Public Policy* 2 (1), 193–221.
- Perry, G.L., 1978. Slowing the wage-price spiral: The macroeconomic view. *Brook. Papers Econ. Act.* 1978 (2), 259–299.
- Phelps, E.S., 1970. Introduction: The new microeconomics in employment and inflation theory. *Microeconomic foundations of employment and inflation theory*. London, Macmillan, pp. 1–26. E. S. Phelps.
- Phelps, E.S., 1972. Inflation policy and unemployment theory: The cost-benefit approach to monetary planning. WW Norton, New York.
- Phelps, E.S., 1978. Inflation planning reconsidered. *Economica* 45 (178), 109–124.
- Phillips, A.W.H., 1958. The relation between unemployment and the rate of change of money wage rates in the United Kingdom, 1861–1957. *Economica* 25 (100), 283–299.
- Rancan, A., 2020. Franco Modigliani and Keynesian economics. Routledge, Abingdon.
- Rees, A., 1970. The Phillips curve as a menu for policy choice. *Economica* 37 (147), 227–238.
- Reuber, G.L., 1981. Steps to improve international economic policy co-ordination. *Canad. Public Policy* 7 (4), 596–603.
- Rogerson, R., 1997. Theory ahead of language in the economics of unemployment. *J. Econ. Perspect.* 11 (1), 73–92.
- Sachs, J., 1980. The changing cyclical behavior of wages and prices: 1890–1976. *Am. Econ. Rev.* 70 (1), 78–90.
- Sachs, J.D., 1983. Real wages and unemployment in the OECD countries. *Brook. Papers Econ. Act.* 1983 (1), 255–304.
- Samuels, W.J., Paavola, J., 1996. Natural images in economics: a review essay. *Rev. Soc. Econ.* 54 (3), 341–366.
- Samuelson, P.A., Solow, R.M., 1960. Analytical aspects of anti-inflation policy. *Am. Econ. Rev.* 50 (2), 177–194.
- Scarfe, B.L., 1973. A model of the inflation cycle in a small open economy. *Oxf. Econ. Papers* 25 (2), 192–203.
- Seidman, L.S., 1978. Tax-based incomes policies. *Brook. Papers Econ. Act.* 1978 (2), 301–361.
- Seidman, L.S., 1979. The role of a tax-based incomes policy. *Am. Econ. Rev.* 69 (2), 202–206.
- Seidman, L.S., 1981. Equity and tradeoffs in a tax-based incomes policy. *Am. Econ. Rev.* 71 (2), 295–300.
- Siven, C.-H., 1972. *Swed. J. Econ.* 74 (3), 406–418.
- Slitor, R.E., 1979. Implementation and design of tax-based incomes policies. *Am. Econ. Rev.* 69 (2), 212–215.
- Smith, W.L., 1970. On some current issues in monetary economics: an interpretation. *J. Econ. Lit.* 8 (3), 767–782.
- Sneessens, H.R., 1987. Investment and the inflation-unemployment tradeoff in a macroeconomic rationing model with monopolistic competition. *Eur. Econ. Rev.* 31, 781–815.
- Sneessens, H.R., Drèze, J.H., 1986. A discussion of Belgian unemployment, combining traditional concepts and disequilibrium econometrics. *Economica* 53 (210), S89–S119.
- Solow, R.M., 1971. Discussion. *Am. Econ. Rev.* 61 (2), 63–65.
- Solow, R.M., 1986. Unemployment: getting the questions right. *Economica* 53.
- Spindler, Z.A., Maki, D., 1979. More on the effects of unemployment compensation on the rate of unemployment in Great Britain. *Oxf. Econ. Papers* 31 (1), 147–164.
- Staiger, D., Stock, J.H., Watson, M.W., 1997. The NAIRU, unemployment and monetary policy. *J. Econ. Perspect.* 11 (1), 33–49.
- Steigum, E., 1987. ARMOD: a small numerical macroeconomic world model with non-clearing markets. *Scand. J. Econ.* 89 (3), 227–246.
- Stiglitz, J.E., 1997. Reflections on the natural rate hypothesis. *J. Econ. Perspect.* 11 (1), 3–8.
- Stiglitz, J.E., Weiss, A., 1981. Credit rationing in markets with imperfect information. *Am. Econ. Rev.* 71 (3), 393–410.
- Strøm, S., 1989. Comment on R. Layard and C. Bean, "why does unemployment persist?". *Scand. J. Econ.* 91 (2), 397–400.
- Summers, L.H., Blinder, A.S., 1986. Perspective: on the share economy. *Chall.* 29 (5), 47–52.
- Tobin, J., 1971. Comments on Fellner, Okun, and Gordon. *Brook. Papers Econ. Act.* 1971 (1), 511–514.
- Tobin, J., 1972. Inflation and unemployment. *Am. Econ. Rev.* 62 (1), 1–18.
- Tobin, J., 1974. Monetary policy in 1974 and beyond. *Brook. Papers Econ. Act.* 1974 (1), 219–232.
- Tobin, J., 1976. Public employment as fiscal policy: Comment. *Brook. Papers Econ. Act.* 1976 (1), 107–110.
- Tobin, J., 1977. How dead is Keynes? *Econ. Enquiry* 15 (4), 459–468.
- Tobin, J., 1980. Stabilization policy ten years after. *Brook. Papers Econ. Act.* 1980 (1), 19–71.
- Tobin, J., 1983. Monetary policy: Rules, targets, and shocks. *J. Money Credit Bank.* 15 (4), 506–518.
- Trevithick, J., 1979. Review of Hirsch and Goldthorpe The political economy of inflation and Parkin and Sumner, Inflation in the United Kingdom. *Econ. J.* 89 (353), 148–151.
- Tullio, G., 1987. Long run implications of the increase in taxation and public debt for employment and economic growth in Europe. *Eur. Econ. Rev.* 31 (3), 741–780.
- Turner, D.S., 1991. The determinants of the NAIRU response in simulations on the Treasury model. *Oxf. Bull. Econ. Stat.* 53 (3), 225–242.
- Turnovsky, S.J., 1972. The expectations hypothesis and the aggregate wage equation: some empirical evidence for Canada. *Economica* 39 (153), 1–17.
- Vickrey, W., 1993. Today's task for economists. *Chall.* 36 (2), 4–14.
- Wachter, M.L., 1974. A new approach to the equilibrium labour force. *Economica* 41 (161), 35–51.
- Wachter, M.L., 1976. The changing cyclical responsiveness of wage inflation. *Brook. Papers Econ. Act.* 1976 (1), 115–167.
- Wallich, H.C., 1978. Comment on "Implications for policy: A symposium. *Brook. Papers Econ. Act.* 1978 (2), 519–520.
- Wiseman, M., 1976. Public employment as fiscal policy. *Brook. Papers Econ. Act.* 1976 (1), 67–104.
- Worswick, G.D.N., 1981. The money supply and the exchange rate. *Oxf. Econ. Papers* 33 (Supplement), 9–22.