Chasing a few hares: An account of the life and work of AWH Phillips

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'[A.W.H. Phillips'] personality was as fresh as his mind was creative. The world of economics was enriched by his restless originality; to be his colleague was to be his friend'.

E.H. Phelps Brown's *Obituary* of A.W.H. Phillips, *The Times*, 6 March 1975[1]

Introduction

I did not do very much. I just put out a few hares for other people to chase. (*Hares*, p.v [& p. 234])[2]

Alan Bollard has written an absorbingly readable biography of the economic life and times of Bill Phillips – of an innovative and humble man, who achieved greatness of a kind that was rare. The author, a distinguished New Zealander, is eminently qualified to write this biography – having spent several years as the Governor of the Reserve Bank of New Zealand, as the chief economist re-assembling the 'No. 1 [Phillips] machine donated by the LSE', the person responsible for 'arrang[ing] to have it … shipped to Wellington [in New Zealand]' and to make sure that 'it is in working order and on display in the Reserve Bank's Museum'.

The academic economist is well aware of the *Phillips Curve*; a subset of them, and some others, are also aware of the *Phillips Machine*, MONIAC[3] (*Mo*netary *N*ational *I*ncome *A*nalogue *C*omputer – as it was named by Abba Lerner); fewer know about Phillips' role in formulating a macroeconomic model of stabilisation policy where Integral, Proportional *and* Differential Policy regimes could be framed, in the Keynesian context of Post–World War (WW) II policy debates; even fewer seem to be aware of the pioneering role Phillips played in advancing continuous-time modelling of economic dynamics.

All this, and more, is elegantly – but also carelessly – discussed and described, with immense respect for, and admiration of, the life and economic times of Phillips, in *Hares*. The next section summarises the contents of the book, in the sequence with which the

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author has chosen to narrate a fascinating story. However, the 'carelessness' that permeates *Hares* makes it a difficult book to enjoy, which must have been one of the aims of writing it. Moreover, it is unfair to the memory of the humble genius, who was preoccupied with accuracy, to the best of his ability and engineering precision. Much of this is interspersed with the descriptive material of Phillips' contribution to macrodynamic modelling, to its methodology, to his stance on stabilisation policy and, above all, to what I consider to be his most fundamental and original contribution: the construction of what came to be known as the MONIAC – the theoretical principles underpinning its construction, working and the possibilities it made feasible for teaching the complexities of implementable policies (both monetary and fiscal). As for (dynamic) continuous-time estimation theory, there were also my own attempts to come to terms with the work of Phillips (1959).[4] The final, concluding section is an attempt to weave the threads that made up 'Introduction' and 'The chase by an "economic hound"' into a patterned fabric, that could at least serve to outline a way to appreciate and interpret the work of Phillips.

I was one of the so-called 'anonymous readers' the publisher contacted with a request for a 'report', which I happily supplied with optimistic comments, but also pointing out some necessary corrections of gross errors. My comments were confined to some of the contents of what has become Part II of *Hares*. I objected to being referred to as an 'economic philosopher' (p. 116) – not that I was averse to such a description of myself – but my 'objections' have obviously been ignored. The book is replete with mistaken allusions.[5] However, the prize typos were the reference to a 'J.K. Hicks' and the repeated spelling of 'Denis' as one of the forenames of Dennis Robertson – Alan for Allan (McRobie) is also a particularly sad 'typo'!

The chase by an 'economic hound'[6]

> There has been an increasing use in economic theory of mathematical models, usually in the form of difference equations, *sometimes* of differential equations,[7] for investigating the implications of systems of hypotheses. However, those students of economics *who, like the present writer, are not expert mathematicians*, often find some difficulty in handling these models effectively. (Phillips, 1950: 283; italics added)

Thus began Phillips, in his first published article, with that characteristic humility for which he was known and which is repeatedly – and justly – emphasised by Dr Bollard, in *Hares*.[8]

Dr Bollard 'confesses', 'I have largely[9] avoided graphs and avoided equations' (p. vi). This is a laudable aim, especially if the 'economic times' of this humble genius are described with reasonable fidelity, and provided that a good list of references is given, so that one may proceed to tackle the more technical papers dealing with the kinds of issues that were broached by Phillips. I think Dr Bollard succeeds, 'largely', in achieving this aim, but not 'entirely' satisfactorily, especially not in part II.

Approximately a third (74 out of 232 pages of the main text) of *Hares* tells the story, in that outmoded grammatical mood of the subjunctive, of the first 23 years of Phillips' pre-economic life of 60 years. The first four chapters are liberally sprinkled with phrases such as 'would have', 'would be', 'would also have', 'could have', 'may have', 'we can only speculate' and 'suggest'. This is a plausible reconstruction of that part of Phillips'

life, spent largely in the Antipodes, East and South East Asia. The author's knowledge of the New Zealand landscape is superbly invoked in describing the kind of life that may have moulded this quiet, increasingly self-sufficient man who refrained from any kind of complaining of whatever hardship he, or his family, had to endure – and there were copious instances of them, as poignantly narrated in the engaging first part of *Hares*.

Apart from the time Phillips spent in a Japanese Prisoner of War camp, and the so-called British Institute of Technology courses,[10] I have no especial knowledge or expertise on any of the topics discussed and narrated in part I. I shall, therefore, simply note some of the salient points of that part of Bill Phillips' life before his arrival in London, 'nearly' around 'Christmas 1937' (*Hares*, p. 43).

The way the independent spirit of a New Zealander may have been inspired by the natural setting of the country is evoked, almost *sotto voce*, in *Hares*:

> The southern half of New Zealand's North Island is bisected by a high mountain range, craggy windswept rocks near the top descending into steep ridges and bush-clad valleys … At the lower end of the mountain range, the Manawatu river cut a gorge through the hills and this provided a route for the Māori tribes who would hunt in the forests and fish on the coast. (p. 8)

And,

> Bullocks, horses, and steam engines dragged the big trees out of the bush into the [saw]mill on old tram lines, later to form the foundations for many of the local roads. Included amongst them was the Kumeiti Road, the two-mile way that led from the back of the Ruahine Range towards the sea, and Topgrass road running along the front of the ranges. The junction of Topgrass and Kumeiti roads marks the farm [where the core of the house] where Bill Phillips would be born and raised …, and it *still stands today*. (*Hares*, pp. 9–10; italics added)

This landscape may well be a testimony to the irrelevancy of nature's bountiful endowments to the fostering of intellectual greatness.

The early and growing life of Phillips, spent in the almost idyllic natural surroundings of the spectacular North Island of New Zealand, cannot be more different from a POW camp in Java or 'digs' in London! But these 'idyllic surroundings' were the backdrop of the harshness of life, the overcoming of which may have cultivated the resilience, the almost single-minded determination to resolve any problem with which he was confronted, a hallmark of the remarkable achievements of Phillips.

Three examples of the innovative ways Bill Phillips came to terms with, and overcame, the difficulties of the limited resources of a rural life – however idyllic the environment was – deserve mention, because they reflect his attitude and determination, in the face of adversity.

First, like many budding geniuses, his thirst for knowledge, growing in a rural community, where his daily journeys to school was nothing short of an ordeal, in terms of the time and the various modes of transport he had to resort to – cycling, walking and a goods train ride, capped by another 'brisk walk uphill three-quarters of a mile to the high school' (*Hares*, p. 25) – to go from home, and return home, early and late, respectively, led to innovative solutions to a problem. As described in *Hares*, Phillips found,

The time he was wasting while biking worried Bill, and he pondered how to address this problem. At last he hit on an answer: he constructed a book stand and fixed it to the handlebars of his bicycle. That way he could read and study as he pedalled. (p. 25)

And, then,

After a year or two now aged about 14, he found another solution. Bill bought the wreckage of an old truck from a neighbor for five pounds. He painstakingly took it apart, found out how it worked, repaired the body, and sorted out the mechanics. Being used to driving a farm tractor, he soon *taught himself* to drive the truck. Next step was to drive it to school. … Of course, there was no driving licence, no registration, and there were no seat belts. The staff at Dannervirke High School were rather disturbed – it was unheard of for a pupil to drive a motor vehicle to school in those days and *Bill was banned from doing it*. But he simply *ignored the ban* making sure to park a few streets away so that no teachers would see the truck and its underage driver, and this arrangement seemed to be tolerated. (*Hares*, italics added)

These noble characteristics – mastering the mechanism of a useful machine, teaching himself a skill, whether cerebral or technological, breaking inconvenient rules and making sure the circumvention was done in a way that made it possible for the 'enforcers' of an inconvenient law to ignore the offender, all at age 'about 14' – stood him in good stead in the years to come, in difficult and better times.

Bill Phillips' father Harold ('known by his contemporaries as Housego, his mother's maiden name', later 'inherited' by Bill Phillips, *Hares*, p. 7) is said to have been very adept at mathematics and reading. Reading Shakespeare would become a life-long interest. Harold Housego was also adept at adapting technology to make electricity available at the home, was innovative in introducing modern livestock breeding methods and was an enthusiast of outdoor sporting activities. Many of these traits passed on to Bill Phillips, except 'reading Shakespeare' and enthusiasm for sporting activities.

His personal exploits and feats, under the difficult captivity by victorious Japanese forces in South East and East Asia, in the Island of Java, have become legendary. They are too well known for me to comment on Bollard's sympathetic description of the ordeals and scars that Bill Phillips underwent during the years as a POW.

The negative remarks on Laurens Van der Post in *Hares*, and this South African's pitiless way of disregarding the important role played by Phillips, in those dark, final, days at the POW camp, receive the kind of opprobrium that they deserve: 'Even though he obviously knew his name, the egotist van der Post may have deliberately excised Bill's name from his account to keep the focus on himself' (*Hares*, Note 15, p. 240).[11]

Part II is divided into seven chapters, Chapters 6–10 largely spanned by the eight path-breaking contributions by Phillips, from 1949 to 1962 – the exceptions being the 5th and the 11th chapters of the book, 'Post-war London' *and* 'China and an ending', respectively. There is also a brief, 13-point, summary *Annex* and a 10-page *Endnote* section on each of the chapters of the book. With the possible exception of point 8, *all* other claims in the *Annex* are demonstrably false.

Chapter 5 describes the 2 years of Bill Phillips' life, between finding 'himself back in London in early 1946' and the end of the glorious summer of 1947 – a period of momentous changes in society, and in the way Phillips himself began to fashion an interesting academic life, although with serious 'birth pangs'. It is a well-written chapter, with the

general social, political and economic background to the world in which Bill Phillips found himself, so that this qualified and experienced electrical engineer's decision to pursue a sociology degree at the London School of Economics (LSE), with increasing interest in economics, might make some sense.

The chapter also documents the linguistic abilities of Bill Phillips – fluent or proficient (at least with reading knowledge), apart from English, in Chinese, Russian, French, Dutch, Malay and German.

Two points raised in this chapter deserve attention. One is the contradictory interpretation by Leeson and Sleeman of the importance – or not – of the wartime experience on his choice of Sociology (*Hares*, Note 5 to Chapter 5, p. 242). The other is the unfortunate penchant of the author of *Hares* to 'indulge' in unnecessary and inaccurate 'Cambridge bashing' (despite his own Cambridge 'pedigree', *Hares*, Note 1, p. 240).

First, 'unlike the *fellow travelers of Cambridge University*', the author writes, 'the conversation around the LSE corridors *would have* reflected all shades of views' (*Hares*, p. 92, italics added). Second, on the same page of *Hares*, one reads, 'Newspaper headlines trumpeted the arrest of spy scientist Klaus Fuchs, and the defection of spy diplomats Guy Burgess and Donald Maclean, rocking *the Cambridge establishment*' (p. 92).

The LSE economics department was not the bastion reflecting 'all shades of views', nor is there anywhere an identifiable 'Cambridge establishment' that was rocked. Moreover, the Fuchs, Burgess and Maclean 'affairs' did not become 'newspaper headlines' till the 1950s, well outside the interval of time discussed in this chapter.

Chapter 6, titled 'Hydraulic machine', is the story of the MONIAC, how and why it was conceived, constructed, implemented and displayed, with mathematical and theoretical foundations in mechanics, hydraulics and macroeconomic theory. It is an important story and I doubt anyone else than the author of *Hares* can tell it better or more forcefully.[12] That, of course, does not mean the chapter's contents are without blemish.

There is no evidence whatsoever that Phillips, or the British Institute of Technology course in electrical engineering that he took, was aware of the burgeoning developments in non-linear (electrical) circuit theory in the 1930s. Nor did any economist at the LSE – at that time – have any knowledge of non-linear modelling of trade/business cycle theories. Without acknowledging this technical 'gap' in Phillips' knowledge base, there is a risk of untenable claims and assertions, as – indeed – there are, in *Hares*, on his contributions to macroeconomic dynamics and stabilisation policy.

This chapter is the longest in the book, and justifiably so. In a way, it is the beginning and the foundations upon which Phillips' remarkable life as an economist developed. There is, however, nothing in the way of MONIAC's relationship to the differential analyser, although in sporadic ways it is pointed out that it was designed to 'solve' differential equations (essentially the *initial value problem* of such equations), assuming, implicitly, the Peano existence theorem and some kind of Lipschitz continuity.[13]

It is in this context that Robertson's perceptive query should be understood:

> Robertson apparently questioned whether Bill could have handled the model through more basic *difference equations. Bill responded* to these in a letter of September 1950, *clarifying his argument*. (*Hares*, p. 115; italics added)

There is no indication in *Hares* of *how* Phillips clarified 'his argument', in the 'letter of September 1950'. Did Phillips acknowledge that the MONIAC was a special differential analyser, which could handle only differential equations – it would not be able to 'handle difference equations', without ad hockeries?

Yet, a persistent reader can easily understand how Bill Phillips went about constructing the MONIAC, how he underpinned the mechanics of the working machine in the macroeconomic theory of the times (with the help of Walter Newlyn) and how his background in electrical engineering would have helped him in putting together the electro-mechanical dynamics of an essentially hydraulic machine – all this by reading this chapter carefully, weeding out the infelicities.

But 'weeding out the infelicities' will not be easy – for the chapter is interspersed with technically incorrect claims, infelicities in references of classics and a complete misunderstanding of the meaning of optimal control theory,[14] all amidst the generous portrayal of the genius that Phillips was, in conceiving the MONIAC.

Several of the assertions about Irving Fisher's Hydraulic Machine are wrong – about when the initial machine was built (p. 96), erroneous statement that the cisterns were connected by 'levers' (p. 96), incomplete and incorrect reference to Fischer's 1982 thesis in the reference list and failure to note that Fisher's *mechanism for the hydraulic determination of equilibrium prices was underpinned by an appeal to* Pascal's Principle – and that this is a fundamental difference with the mechanism of the MONIAC.

The claims for Leontief's assertions, in *Hares*, pp. 96–97, are wrong;[15] Leontief discusses 'the fundamental difference' between the flow of water in a river and the flow of goods in an economy, as well as the drawing of 'erroneous conclusion' from a 'false analogy' (between the two flows).

In Note 5, p. 242, the reference to the title of the second edition of Allen's *Mathematical Economics* is incorrect. The composition of the 'Cambridge Circus' group (p. 104) did *not* include Keynes, but did include Meade. The claim that Hayek's *The Road to Serfdom* 'would later help win him the Nobel Prize' (p. 105) cannot be substantiated. Both statements about the two modern classics by Hicks and Samuelson,[16] on pp. 113–114, are hopelessly wrong. There was no 'third edition of *Foundations*' (p. 114) in which 'Samuelson synthesized a quasi-Keynesian Hicksian framework'.[17] Phillips could not 'have been exposed to the intellectualism and policy interest of … Kaldor', at the LSE (p. 114) – simply because he (Kaldor) had left by the time Phillips arrived there.

It is claimed in *Hares* that this reviewer pointed out that the MONIAC 'would not pass the Turing test for being an analogue of the real world' (p. 116)! This is an incorrect claim, theoretically and factually; theoretically, because '*the Turing test*' is the basis for a kind of test for what has come to be known as Artificial Intelligence; factually, because I never made such a preposterous statement.

The Skidelsky story (p. 117) about Marty Feldstein who 'used the machine to explain the Keynesian circular flow of income', although amusing, should never have been rehashed the way it is done in *Hares*. Skidelsky adds a qualifying remark (italics added), that Feldstein's explanation was 'based on an actual machine Alec Cairncross had caused to be constructed at the LSE'! How could 'Ramsay McDonald and the other politicians around at this time' – that is, 1929–1931 – understand 'the principles of [MONIAC]', when Keynes had only just begun writing the *General Theory*! Machlup was never at Harvard (p. 122).

Finally, there is no clear indication of the importance of a flexible, non-linear, accelerator and a dynamic multiplier, jointly generating and maintaining aggregate fluctuations; instead, almost all the discussion is against the backdrop of a linear accelerator. I believe this was partly due to Newlyn's influence on Phillips; Newlyn adds, incorrectly, that Goodwin was inspired to use the (non-linear) accelerator as a result of its (linear) incorporation in the Mark II MONIAC (Leeson, 2000, editor: Chapter 8). *It was, in fact, the other way about*!

Chapter 7, on 'Stabilization and computing', is only a page shorter in length than the previous one, but is as informative and interesting, although far less marred by the kind of infelicities of Chapter 6 and its notes. It is about the 'interregnum' professional years between the construction of the MONIAC, the successful beginnings of an academic economist, at an outstanding Institution, the enrichment of a personal life *via* a romance which led to a marriage and a lifelong loving and devoted partnership, and the next stage in a research career that blossomed into work that became pioneering, with many ramifications in the theoretical, empirical and applied worlds of macroeconometrics, dynamic macroeconomics and continuous-time estimation.

The two key contributions by Phillips, for Chapter 6, are the classic *Economic Journal* articles of 1954 and 1957, but also his reviews of Kalecki's book of 1954[18] and Tustin's, also of 1954, belong to this period,[19] as should Phillips' Zurich cybernetic paper of 1958. Two important events of this period – one academic and the other personal – need to be mentioned (*Hares*, pp. 138–139 and pp. 130–131[20]). As described,

> On 10 December [1953] Bill was examined by Sir John Hicks[21] on his thesis entitled *Dynamic Models in Economics* … On 26 January [1954] the Academic Board of the University of London awarded Bill's PhD degree; … That month there was more good news: Bill was to receive the Hutchinson Medal for excellence in research work by a student, awarded for the best thesis across all LSE disciplines. (*Hares*, pp. 138; italics in the original)

Then, as if to celebrate these honours,

> On an autumn day in September 1954, Alban William Housego Phillips married Beatrice Valda Bennett at the Kensington Registry Office … It was a low-key start to what would prove to be *a low-key but enduring marriage*. (*Hares*, p. 131; italics added)

The subsection on 'Personal and academic life' (pp. 150–155) is a relaxed and generous description of the domestic life of Bill and Valda Phillips and the duties and burdens of an increasingly successful academic economic career of Bill Phillips, culminating in his appointment as the Tooke Professor of Economics[22] at the LSE.

To return to the five classic contributions mentioned above, by Phillips, two preliminary comments need to be made. In referring to Phillips' Zurich paper,[23] Bollard writes,

> In 'Cybernetics and the Regulation of Economic Systems' [Bill Phillips] recounted some of his 1957 results, bringing together his thinking on what *optimal control* models could offer the problem of regulation. This time the policymaker did not have to rely on trial and error feedback rules, because Bill was moving from classical feedback theory to *optimal control* theory. (*Hares*, p. 149)

I doubt the author of *Hares* has read this article by Phillips carefully or that he understands the difference between classical and optimal control theory; none of the claims about optimal control and optimal control theory can be substantiated. Phillips' Zurich Conference paper remains a good contribution – not a pioneering one – to the literature on Cybernetics, which was taking a different direction from Optimal Control Theory.

Incidentally, the implicit criticism of the National Physical Laboratory's focus being 'too theoretical', implying thereby also a critique of the work being done by Phillips 'on the analogue computer' (p. 150), is, at best, amusing. Also, the 'radically advanced new digital computer, the Automatic Computer [sic!][24] Engine (ACE)' (p. 146) (designed by Alan Turing).

Before moving on to the 'stabilisation' problem, supposedly pioneered by Phillips, within a servomechanism, or negative feedback framework, it will be useful to remember, first, that the following assertion in *Hares* is meaningless:

> In his early formulations Bill used servo-mechanism feedback theory, calculating in *discrete time on analogue computers*. Gradually he would move to optimal control theory, calculating in *continuous time, on digital computers*. (p. 134; italics added)

The opposite is the fact (*Hares*, pp. 145–146) that analogue computers were – and are – utilised in continuous-time problems, discrete time or discrete data problems are natural repositories of digital computers. Phillips, late in his economic modelling life, struggled to find a technical solution to the problem of continuous-time estimation on digital computers. It is about reconciling scientific computing *and* computability[25] theory.

Second, both Herbert Simon and Richard Goodwin pioneered the use of servomechanism theory in economics, long before Bill Phillips. Moreover, Bill Phillips was comprehensively wrong[26] to state the following in what he wrote to Charles Holt in October 1956:

> The analogue machines are, I think, essential if we are to go beyond linear models with a small number of relationships and deal with non-linear models with a fairly large number of relationships. (*Hares*, p. 145)

Third, it was Goodwin, in the late 1940s, who pioneered the evaluation of the dynamics of policy stabilisation, using short-run aggregative models of non-linear fluctuations, in the Anglo-Saxon literature.

I wish it had been emphasised, in *Hares*, that Phillips' elementary conclusions on policy dynamics were based on an ultra-simple, linear model of the economy. Whether he was motivated by his electrical engineering training or his nascent interests in servomechanism theory, Phillips was ill-informed about the non-elementary conclusions on dynamic stabilisation policy intrinsic to non-linear circuit theory and non-linear dynamics, both of which had been copiously used in mathematical macrodynamics.

'Ultimately', claims Dr Bollard, 'the Phillips curve article is about a statistical relationship' (*Hares*, p. 170). Yet, the previous section[27] (the second of this chapter), which begins with the Laidler (2002) quote that 'Every economist has heard of Bill Phillips, most of them for the wrong reason' (p. 223), is supposed to have drawn 'primarily on Lipsey (2000)', as the author states in Endnote 2 to this chapter (*Hares*, p. 245).

I am afraid the contents of this chapter show no evidence whatsoever that either Laidler (2002) or Lipsey (2000) has been properly read.

First, had Dr Bollard read the Laidler piece carefully, most of the erroneous claims on optimal control theory could have been avoided – but not all, because Laidler (2002) himself adds another dangerous comment on the topic:

> These articles [Phillips, 1954, 1957] do *not* deal with questions of optimal control, as the title of Adrian Pagan's otherwise exemplary introduction [in Leeson, 2000] to the first two of them misleadingly suggests … . It was only later, in the 1960s that Phillips became explicitly concerned with optimal control, as Pagan (p. 131) does indeed make clear. (p. 226; italics added)

The second sentence in the above quote is not correct.[28]

Second, Laidler's (2002) observation that 'the idea of the curve came from Phillips' reading of Bent Hansen's (1951) *Theory of Inflation* …' (p. 228) leads on to Lipsey's 'three considerations'[29] on Phillips' own view of what the curve that bears his name *should* mean, where the most important of these is that it depicted the economy's lack of self-adjustment capabilities, and therefore, the curve represented a *disequilibrium phenomenon*, as in Bent Hansen, in the tradition of Lindahl.[30] To the credit of the author of *Hares* (pp. 169–170), all three points Phillips raised with Lipsey are handsomely acknowledged – although without mentioning the underpinning in Bent Hansen's work.

The other important point, emphasised in *Hares*, in connection with the geometric form of the relation that came to be called the *Phillips Curve*, is the following: '[I]t was a distinct improvement on the old textbook treatment, with its sharp dichotomy between stable prices and inflation' (p. 169; italics added). This statement should be coupled to Lipsey's 'historical' observation[31] that removing the classical dichotomy was important in useful models of stabilisation policy – but 'useful' also in the sense of an engineering mechanism that could encapsulate reasonably smooth flows.

To the idea that the three articles by Phillips of 1954, 1957 and 1958 'need to be seen as a unit', I would add Phillips (1950) – and the part played by his background in electrical engineering in the construction of the MONIAC.[32]

The 'Friedman connection' is pointed out in this chapter because it was, in many ways, the launching pad for what came to be the dominant kind of macroeconomics at the frontiers today. Moreover, Dr Bollard, in *Hares*, was perceptive in reporting that 'Friedman argued [that] the [Phillips] curve should have been stated in *real* not nominal wages, and Friedman's recollection is that Bill was persuaded of this' (p. 178; italics added).

Coupled to the long-run nature of the Bent Hansen model, a 'complete' Phillips model of the dynamics of an advanced industrial economy would incorporate a consistent interaction between the short-run dynamics of aggregate fluctuations and long-run growth. This was provided by Goodwin (1967), in his *Dobb Festschrift* contribution, where the *one* non-linearity that generated the dynamics between wage shares and unemployment was a real Phillips curve.

Finally, much is made in this chapter of Friedman's indebtedness to Bill Phillips for the adaptive expectation hypothesis, which underpinned his expectations-augmented

Phillips curve in that famous 1967 address. Not the author of *Hares*, nor Bill Phillips, and not even Friedman seem to have read the famous Muth article of 1961 carefully.[33] Had they done so, they would have realised that the adaptive expectation hypothesis was intrinsic to the cobweb model of the cycle.

This chapter, too, is marred by infelicities. Tinbergen (1952), on p. 160, should be Tinbergen (1951); everything about Samuelson's *Foundations of Economic Analysis* – on p. 171 of *Hares* – is incorrect;[34] 'Fabo Schaparelli' refers, most likely, to Fabio Schiantarelli (Endnote 5 to this chapter, p. 245); Endnote 3 to the final chapter gives the wrong reference (Leeson, 1997, rather than Dorrance and Leeson, 1997) and is incorrect about the claim on Meade (*Hares*, p. 246):

> Apparently Meade himself was not feeling comfortable at Cambridge where there were destructive arguments underway with Joan Robinson and others. Meade actually resigned his own Chair there in 1967 and considered returning to LSE. (Leeson, 1997)

No such substantiation for the claim can be found in Dorrance and Leeson, for one thing, and what does Bollard mean with 'destructive arguments'?

Chapters 9, 10 and 11 are descriptions of Phillips' life and work during the last decade and a half, of times spent in London, Australia (Canberra) and, finally, back in New Zealand (Auckland). The return to the Antipodes, now committed to developing his almost lifelong interest in China, thwarted by an unkindly shortened life, first by illness, then by death, is narrated with compassion and sadness by Dr Bollard.

Incidentally, there is a fine analysis of the formalism of Phillips (1961) in Allen (1967: Chapter 20, especially § 20.2). Allen subjects it to clear local stability analysis.

I must, however, point out that the claims of priority or originality for the work by Bill Phillips on growth cycles and continuous-time estimation are slightly exaggerated by the author of *Hares*. The chapters, at least 10 and 11, are sprinkled with the familiar infelicities – research in mathematical growth theory, in the US, was being led by Evsey Domar; bracketing Mundell with the other distinguished Professors of Massachusetts Institute of Technology (MIT) is a typical mistake (*Hares*, p. 188); Endnote 1 to Chapter 10 is puzzling in a book otherwise devoid of mathematical 'hieroglyphics' – especially since the reader was forewarned already on p. vi!

Alas, the index is inadequate and the reference list woefully proof-read.

Reflections and ruminations

> Bill's 1954 and 1957 papers were both very well received by the profession for their originality and economic advance. Apart from his famous Phillips curve paper, these two publications would become the most widely cited of Bill's career. (*Hares*, p. 149)

This pithy characterisation is, in this reviewer's opinion, a sad reflection of the preoccupations and ideological stances of the 'profession'.

When Arthur Porter built a differential analyser with Meccano Set parts, for Douglas Hartree,[35] it 'proved unexpectedly successful' and did what the MONIAC did to demystify some of the macroeconomic controversies of the times. Above all, both Phillips and

Irving Fisher stressed the importance of transparency and teaching economic principles, (monetary) macroeconomic fundamentals (and utility-based microeconomics).

Unfortunately, Phillips' noble name will forever be associated with the *Phillips Curve*. Many will also consider the ostensibly original introductory contributions on proportional, derivative and integral policies for stabilising an unstable macroeconomy,[36] developed by means of simulation in models that were underpinned by servomechanism theory, as pioneering – as, indeed, they were, to some extent. Still others may make sporadic references to Phillips on growth theory and dynamic continuous-time estimation.

But a unified consideration of the MONIAC and the four macroeconomic classics of Phillips (1950, 1954, 1957, 1958), with some consideration of Phillips (1961, 1962), is the way to pay homage to this humble giant of a theorist. Even within these, it is the construction of the MONIAC that should be considered the jewel in the crown of the contributions by Bill Phillips.

It gave me particular pleasure to read this book by Dr Bollard, 'warts and all', simply because – in the end – I believe *that* is the main message of this book, too.

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Notes

This Review Article (RA) of *A Few Hares to Chase – The Economic Life and Times of Bill Phillips* by Alan Bollard, Oxford University Press, Oxford, 2016 (henceforth, *Hares*) is written in *homage* to Björn Thalberg – who introduced me to the writings of Phillips.

1. Quoted in *Hares*, p. 214 (incorrectly, as being in *The Times* 'the day following his death' – a trivial error, but one that mars this interesting, engaging, yet also irritating book, replete with typos, incorrect attributions and erroneous conceptual, technical and factual claims. A more extensive version of this Review Article (RA) can be found in http://www.assru.org/Publications.html
2. See Leeson, ed., (2000: 28), for Brian Silverstone as the source of this phrase. All of the articles by Phillips referred to in this RA, between 1950 and 1962, are reprinted in Leeson (supra); Phillips' 1949 typescript was republished in Economia Politica, December 2011.
3. Named to rhyme with other (main frame) digital computers, ENIAC (Electronic Numerical Integrator and Computer) and MANIAC (Mathematical Analyzer, Numerical Integrator and Computer), although the MONIAC (*Mo*netary *N*ational *I*ncome *A*nalogue *C*omputer) is an analogue computer.
4. The approach pioneered by Phillips is being advocated, currently, by Dixon, Parmenter and so on, and Laidler's (2002) reason, for the demise of this method, is incorrect. The Phillips method, in the hands of Dixon and his associates, refers to Computable General Equilibrium (CGE) in the sense of Leif Johansen's model of multisectoral growth. The new classical notion of CGE is quite different and the computational model underpinning it is ad hoc – that is, no consistent attempt to estimate continuous-time models with discrete data.
5. Samuelson's classic Foundations of Economic Analysis is confused – repeatedly – with the 1955 third edition of his textbook, in *Hares* (p. 114).
6. Phillips was born on 18 November 1914, in Te Rehunga and died on 4 March 1975 in Auckland, both in New Zealand.

7. I don't think this is an accurate statement of economics even in 1950.

8. Richard Goodwin always emphasised what a nice and humble man Phillips was – and Goodwin should know: he was the custodian of the Cambridge Phillips Machine, now resurrected and maintained with loving care by Dr Allan McRobie, at Cambridge.

9. 'Entirely' would be a more appropriate word to use, here!

10. Wulwick, in her 1994 response to Leeson, asserts, inaccurately, in the opening line of the article that 'AWH Phillips received a degree from the London Institute of Electrical Engineers in 1938 … '. Phillips 'applied for and was granted' Associate Membership of the Institute of Electrical Engineers (AMIEE), as correctly pointed out in *Hares* (p. 43). Phillips never 'received a degree' in electrical engineering from any academic or higher institution.

11. Robert Leeson 'forced' van der Post to acknowledge Phillips (*Hares*, p. 68).

12. In Note 18 (*Hares*, p. 243; italics added), the author notes, 'I carried out much of the assembly on the New Zealand [MONIAC] machine'. More importantly,

> *I* spent many hours in an old garage puzzling over how to assemble [the MONIAC], and in doing so learned something of the genius of the designer. (*Hares*, p. vi; italics added)

No one who has constructed or assembled a machine, to function as it was designed to do, knows how much one learns in doing so and the kind of skill that such a 'learning by doing' activity entails. Above all, one learns the limitations of such a machine, too.

13. Hence, perhaps, his increasing interest in continuous-time estimation problems.

14. Brian Hayes (2009) goes too far in stating,

> Beginning in the 1960s, modern control theory introduced a new computer-intensive methodology … This collection of techniques, known as optimal control identifies the control law that comes closest to satisfying a given criterion. (p. 188; italics in the original)

Hayes (2009) is also incorrect in claiming that

> [The 'Lucas critique'] had the collateral effect of dampening enthusiasm for application of control theory in macroeconomics. (p. 191)

Even a casual perusal of standard textbooks on macroeconomics would show that 'optimal control' is 'alive and well'.

15. Page number reference 18–212 should be 181–212.

16. The dating of this reference in the Bibliography (p. 256) is wrong.

17. The 'neoclassical synthesis' appeared first in the third edition of Samuelson's textbook, motivated by the need to 'get McCarthy off [his] back' – and not due to any meaningful 'synthesis' between neoclassical microeconomics and Keynesian macroeconomics.

18. Much of what is written in *Hares* (p. 132) about Kalecki's 1939 and 1954 books is incorrect. The latter was not a 'reprint' of the former, nor was the former 'written just after [Kalecki] had been at the LSE and Cambridge'. The summary of the review, in *Hares*, leaves much to be desired and Allan McRobie's exercises with the MONIAC (*Hares*, p. 132) is technically incorrect since he was using a piecewise linear differential equation.

19. These four contributions by Phillips are grouped together in Part III, Dynamic Stabilization and Optimal Control, in Leeson (2000), with an introductory article for the four by Adrian Pagan, titled The Optimal Control Articles. None of the four papers by Phillips has anything whatsoever to do with Optimal Control (not even under the broader definition given by Hayes, see Footnote 28).

20. Strangely, the two events are reported in reverse order of occurrence in *Hares*!
21. Hicks was knighted only in 1954 – the other references in *Hares* are not to Sir John Hicks!
22. 'During the *1950s* … Hayek left for Chicago, as did Ronald Coase' (*Hares*, p. 154; italics added). Hayek left the London School of Economics in 1950 and Coase did not settle down in Chicago till 1964. The author means James Mill when he writes John Stuart Mill (*Hares*, p. 155). John von Neumann is referred to as one of 'a number of brilliant Hungarian economists' who had 'moved to the West' (*Hares*, p. 156)!
23. It was in Zurich he met Dennis Gabor, the inspirer of Norbert Wiener's additions to the revised, 1961, edition of Cybernetics.
24. ACE stands for Automatic *Computing* Engine. I make this remark because I am not sure the author of *Hares* has mastered the meaning of computation, whether by an analogue or a digital computer.
25. The one use of the word computability in *Hares* is incorrect, so is the use of computational complexity (pp. 189 and 141, respectively).
26. As is the author of *Hares*, when he writes, 'This – i.e., Phillips (1957) – was the world's first example of such an economic model being simulated on a computer, and the first sophisticated calculated policy results for stabilizing the economy' (bottom, p 148).
27. The first section of Phillips Curve unfortunately (cf. Footnote 16) 'draws on material from Wulwick's [1989 paper]' – as the author declares in the first endnote to this chapter (*Hares*, p. 245).
28. Laidler adds a gratuitous comment, which is both inaccurate and irrelevant:

    > The [Phillips] curve was presented in (1954) as an adjustment equation describing the out-of-equilibrium behaviour of the price level … (p. 228; italics added)

    'Out-of-equilibrium' refers to the traverse of a Neo-Austrian dynamic system towards a 'new' steady state equilibrium.
29. It is the second chapter in Leeson (2000).
30. The Phillips Curve appeared, first, in Phillips' 1954 article on stabilisation policy.
31. In the Phillips Festschrift.
32. I interpret, on 'my side', the *Hares* reference to Alford's story (p. 161).
33. Although the Cagan model of 1956 antedates Muth.
34. Obviously, therefore, Endnote 8 to this chapter (p. 245) cannot be a reference to the Foundations of Economic Analysis!
35. In Note 7, p. 244, Bollard observes,

    > [T]he differential equation solver [was] constructed mainly of meccano at Cambridge University in 1935 … . It is now on display at MOTAT in Auckland …

    This important fact would have gained more verisimilitude had the author put in correct perspective the 'derivative' nature of the Cambridge construction and its improvement over the original Manchester meccano model. Building a differential analyser with meccano parts is an example of constructing a discrete machine to compute continuous dynamics.
36. I was surprised there is no reference to Chapter 18, on Economic Regulation, of Allen (1967), in *Hares*.

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