

The Phillips Controversy

A Further Reply to Chapple

Robert Leeson*

1. The Three Zones of Phillips' RI-C-CU Curve¹

This essay corrects Simon Chapple's (1998, 78) assertion that Phillips' original curve was designed to display a "Big Trade-off" – a menu of policy choice at *all* points on his "long run equilibrium curve ... The permanent policy nature of the trade-off is clear in Phillips's own words". For the one-zone interpretation to hold, Phillips must have concluded that *any* configuration along his curve (from 32% wage inflation to 22% unemployment) represented a permanent and stable trade-off. Since no economist would suggest that exchange rate fixity combined with an inflation rate twenty times higher than one's trading partners would produce a stable policy environment or extraordinarily low rates of unemployment this conclusion would have placed Phillips in a professional minority of one. By a continuity argument, if it is accepted that Phillips did not suggest that 32% wage inflation was sustainable, there must be some limit to the amount of inflation that he did think was sustainable. According to his writings, that limit was about 2-3% price inflation for the British economy. If inflation was higher than that, Phillips stated that the exchange rate would be unsustainable. With real wage resistance (Phillips 1962, 11-13), this would generate the "vicious spiral" of inflation and devaluation (Phelps Brown 1969, 116).

Like many observers before him, Phillips noted that in a boom, and just prior to the bust, low unemployment was associated with high inflation. But he did not imply that such a position could be targeted: that is a misinterpretation of his dynamic stabilisation proposals. The one-zone interpretation was largely foisted on the profession by counter-revolutionaries seeking to overthrow the post-war orthodoxy. The criticisms made by Milton Friedman (who used "Phillips' Adaptive Inflationary Expectations Formula" to undermine the high inflation Phillips curve) simply do not apply to Phillips' work. Neither do the criticisms made by Robert Lucas in presenting a version of the Critique of Econometric Policy Evaluation, which Phillips had constructed several years before.

Phillips (1961, 365; 1962, 11-12; 1958, 299) divided his curve into three zones and stated that he was only "interested" in the low to zero inflation range: the "compromise solution". In addition to the trade-off or "compromise" (C) zone, which Phillips suggested was available to policy makers, there were, in Phillips' RI-C-CU curve, two other dysfunctional zones of runaway inflation (RI) and "catastrophic" unemployment (CU), neither of which were on the contemporary policy agenda. Phillips (1962, 13; 1968, 159) wrote almost nothing about "catastrophic" unemployment, but it is implausible to suggest that he regarded 22% unemployment as a sustainable equilibrium position. The same logic applies to the inflation-devaluation zone, described by James Meade as the "runaway inflation" zone: "I am quite certain that Bill was very conscious of the limitations to which you could reduce the level of unemployment without incurring a runaway inflation" (cited by Leeson 1994, 616, n19).

Chapple, in his attempt to find evidence for the one-zone interpretation replays a minor and a major theme. The only assertion that is not consistently false relates to the minor theme which is not in dispute and is certainly not original to Chapple: Samuelson and Solow's (1960) essay is interesting (Chapple 1996, 28; 1998, 83). Chapple challenges me to find evidence for a proposition which I have never made. His major theme consists of the two assertions (A1 and A2) and a defective conclusion (C1):

A1: Leeson argues that there is no trade-off in Phillips' work (this is false).

A2: Phillips discusses the trade-off in the low inflation "compromise" zone (correct).

C1: Leeson's argument is therefore wrong (this is defective logic).

The logic is defective because the conclusion (C1) is crucially dependent on a false assertion (A1). Chapple (1999) claims that he has forced me to acknowledge "that Phillips *did* have a trade-off ... good. This is progress". But Chapple (1998, 78) has already acknowledged that this assertion is false by his citation from Leeson (1997b, 51): "*Phillips certainly wrote of the trade-off possibilities in the low inflation region: (I have never suggested anything to the contrary) [emphasis in original]*". My clearly stated thesis is to distance Phillips from the proposition that "*any [emphasis in original] point on the curve - in particular points of ongoing and non-trivial rates of inflation - could be targeted for policy purposes*" (1997a, 167).

The quotes from Phillips provided by Chapple offer no evidence in favour of what Chapple (1998, 77) calls a "permanent menu of policy choice" outside the low inflation zone because Chapple neglects to report that Phillips' discussion of the trade-off relates to the "compromise" zone. Chapple refers to Phillips' discussion of the "difficult choice", but neglects to report that Phillips' trade-off related to minor deviations from zero price inflation. The endpoint of this "compromise" zone was 1.5% unemployment (associated with 3% price inflation). Phillips then discussed this "difficult choice" in terms of *reducing*, not tolerating, inflation: "Then we can only reduce inflation, for any given rate of productivity, at the cost of higher unemployment". Chapple refers to Phillips' suggestion of "a compromise solution" involving "a lower, though not zero, speed of inflation", but neglects to report that Phillips specified the level of inflation in this compromise zone: 2% unemployment and approximately 1% inflation.²

Chapple has failed to provide any textual evidence in favour of the one zone interpretation: the evidence cited relates to the low inflation "compromise" solution which is not in dispute. What is in dispute is the proposition that Phillips advocated that high inflation would permanently reduce unemployment. Chapple's "ample evidence" is the equivalent of taking the advice that one or two standard drinks per day may be beneficial, adding the observation that a binge may produce a temporary euphoria, and then accusing the Drink Safe authorities of advocating that thirty two standard drinks per day will guarantee good health and longevity.

2. Phillips, Inflation and Devaluation

Chapple (1998, 82, 73-5) asserts that Phillips' opposition to inflation was "poorly articulated ... a bit like apple pie ... the prediction [that] the trade-off can be exploited in this way according to other 'economic, political or social considerations' is a logical corollary of his model". As textual justification for this "must be emphasised" assertion, Chapple reproduced an *almost* complete paragraph from Phillips (1954, 293, 290) about the desired level of production which "given the existing productive resources, would result in a certain level of employment, or it may be that which would result in a constant price index of consumers' goods, or the choice may be based on a number of other economic, political or social considerations". Chapple then deletes half a sentence before continuing the quote: "... the choice of desired production may be considered as given". But the deleted half sentence contains the qualification which falsifies Chapple's assertion: "*For the*

limited purpose of studying the principles of stabilisation in a *closed economy* the choice of desired production may be considered as given" [emphases added]. The cited paragraph comes from Section I in which prices are assumed to be constant. Flexible prices are only introduced in section II, where Phillips (1954, 308) assumed that the desired level of production resulted in a constant level of product prices. Phillips argued that by abstracting away from changes in prices and exchange rates any desired level of output could be chosen to illustrate his stabilisation proposals. But as soon as product prices are introduced he demonstrated the destabilising influence of inflationary expectations; as soon as exchange rates are introduced he cautioned against an inflation-devaluation spiral.³

Chapple (1998, 81) denies that Phillips offered "any *analytical* [emphasis in text] conclusion that the trade-off was unstable ... It is difficult to find discussions on instability in Phillips's work". The textual evidence refutes this assertion. Phillips (1954, 298-9, 311, 313) demonstrated how flexible prices (as integral-type forces) could generate a "dynamically unstable" system, and then analysed how inflationary expectations operated as a "destabilising mechanism". The expectation that inflation would not continue stabilised his system; the expectation of ongoing inflation destabilised the system: "When price expectations operate in this way, therefore, the system ... becomes unstable". This is consistent with the distinction between the "compromise" zone where, according to Phillips, the trade-off can be reliably exploited, and the "runaway inflation" zone where it cannot.

Phillips (1962, 1-2) warned that post-war employment had been "extremely high", with price inflation averaging 3.7%: "There would be fairly *general agreement* that this rate of inflation is undesirable. It has undoubtedly been a major cause of the general weakness of the balance of payments and the foreign reserves, and if continued it *would almost certainly make the present rate of exchange untenable* [emphases added]." Thus with only a small inflation differential between the UK and her trading partners, a second post-war devaluation was likely.

How potent was Phillips' threat of devaluation – bearing in mind that the Bretton Woods system of fixed exchange rates had been designed to prevent a repetition of the "Devaluation Cycle of the 'Thirties'" (League of Nations 1944, 122)? Was Phillips' opposition to inflation "poorly articulated" as Chapple asserts or precisely linked to a major trauma of British history? The three Autumnal "D-Days" occurred at 18-year intervals (1931, 1949 and 1967), and Phillips connected his opposition to inflation to the prospect of a third "D-Day" trauma (regarded with almost unanimous horror by economists, journalists, voters and politicians of all parties). In the late 1950s, Britain was traumatised and polarised by the Suez crisis. This humiliating imperial blunder need not have been aborted had the government been prepared to abandon its commitment to preserving the external value of sterling. But the loss of imperial face (rapidly followed by the loss of empire) was preferable to the humiliation of a falling pound.

Just 4 months before Phillips' warning about devaluation, the Leader of the Opposition stated that "All of us know, and the world knows, that a further devaluation would not be like the last one – a readjustment forced on us for years after the war by the consequences of the war and a hungry post-war world. A second devaluation would be regarded all over the world as an acknowledgment of defeat, a recognition that we were not on a springboard but on a slide" (Wilson cited by Foot 1968, 138-140). Wilson's 1964-70 Labour Government tried what Friedman (1988, 430) described to President-elect Nixon as "one unpopular expedient after another" to avoid devaluation. Wilson (1971, 59, 65, 570, 744) felt he was being asked "to bring down the curtain on parliamentary democracy ... It is difficult to describe what it means to live against a background of this persistent speculation ... this damaging strike of speculative capital".

He described the "defeat" of devaluation as the worst experience of his life: "It has been hell" (cited by Davis 1968, 162). The unfortunate Chancellor gave the impression that his "nerve had cracked" (Jenkins 1991, 190). Callaghan's "lips quivered, his hands shook, he had no idea what had hit him" and he immediately resigned (George Wigg, cited by Bruce-Gardyne and Lawson 1976, 129). Several wives came close to nervous breakdowns: Audrey Callaghan complained to Susan Crosland (1982, 188-9) that "I can't sleep. I wake up and I can't make my brain stop". The evidence does not support Chapple's assertion that the prospect of devaluation was simply "apple pie".

Chapple (1998, 82, 77) asserts that when Phillips "writes down a theoretical equation for the curve, the ad hoc shift factors are not included",⁴ Chapple states that it is necessary to pay the Australian essay "the greatest attention". In this essay Phillips (1959) writes down and estimates a theoretical equation for his curve:

$$W'_t = 1.463 \frac{1}{U_{t-3}^2} + 0.4145 \frac{1}{U_{t-3}} + 0.1498 \left[\frac{1}{2} (X'_{t-1} + X'_{t-2}) \right] + 0.1337M_{t-3} + 2.110$$

Thus, contrary to Chapple's assertion, wage inflation (W') is formally modelled as a function of unemployment (U), import (M') and export (X') prices. Import price inflation is the third explanatory variable in Phillips' (1958, 283-4) British model. But Chapple (1996, 221) asserts that these shift factors "are only mentioned when Phillips discusses policy or empirical issues".

3. Phillips' version of the Phillips-Friedman-Phelps Critique

In a long passage cited from Phillips (1959), Chapple (1998, 78) has deleted the information which contradicts his argument. The first two unreported assumptions are that the Australian curve was derived assuming zero change in import and export prices and productivity increase of 2%. Phillips' trade-off related to 2.25% unemployment and 1.5% price inflation. Phillips also discussed two alternative scenarios: the first was with unemployment at 1%, and price inflation at 3%. Chapple then misquotes the second scenario: "If demand were held at a level sufficient to reduce unemployment much below this level, the speed of inflation would be very greatly increased. Thus with unemployment at about 1/2 per cent we would [sic] expect wage and price changes in [sic] the order of 10 per cent per year."

But this only describes Phillips' initial effects. Like Phillips, Friedman (1968, 9-11) described the initial expansionary effects of a reduction in unemployment - but no one would accuse Friedman of believing that inflation would permanently reduce unemployment: "it describes only the initial effects". Friedman's mechanism involved real wage resistance in response to the initial "simultaneous fall *ex post* in real wages to employers and rise *ex ante* in real wages to employees". Thus real wage resistance plays an equilibrating role in Friedman's version. In contrast, in Phillips' (1959, 4-5)-version of the Phillips-Friedman-Phelps Critique, real wage resistance thwarts the policy-induced response to an inflation-induced devaluation, setting up a destabilising inflation-devaluation spiral. Phillips doubted that workers would benefit from wages outstripping productivity growth (about 2% per year): "if wages and prices rise together so that we have a steady inflation, it is not the capitalist who will lose by it ... if this [inflationary] process went very far it would have to be offset by a depreciation in the external value of the Australian pound". Although devaluation might be expected to improve the external trade balance, this can hardly be described as an 'adjustment mechanism' with respect to internal imbalance, since devaluation tends to shift demand towards domestic producers, exacerbating the existing demand-pull inflation, while increasing import prices increases cost-push inflation. Phillips (1962, 15, 11) argued that if inflation differentials could be

restrained to "at most 2 per cent per year", the external imbalance could be addressed by limited adjustments in the exchange rate. But the internal imbalance (requiring anti-inflation policies) would still need to be addressed - a further 'stop' in the stop-go cycle.

Phillips' version of the Phillips-Friedman-Phelps Critique was a potent constraint on policy makers: inflation had more serious consequences for Phillips than for Friedman. For Friedman, the (purely internal) imbalance corrected itself through utility maximising labour supply adjustments, as inflation ceased to be incorrectly anticipated. But in Phillips' model, external imbalance (driven by minor inflation differentials) could be addressed by exchange rate adjustment, leaving the internal imbalance in need of still greater attention.⁵

Phillips' and Friedman's theoretical curves were both augmented by inflationary expectations, but in very different ways. For Friedman, the private sector is inherently stable and expectations are *stabilising*, forcing the short-run Phillips curve back towards expectational equilibrium at the natural rate of unemployment. Expectations are the vehicle by which instability (represented by the shifting short run Phillips curve) is dissipated. For Phillips, the instability associated with expectations provides no such comforting endpoint. Inflationary expectations *add* to the instability that his proposals were designed to minimise. Phillips' critique of the high inflation trade-off is thus far more constraining for policy makers: the expectation that inflation will continue produces *destabilising* forces in his model.

Chapple (1999) offers a truncated quote from Leeson (1997b, 166): "Phillips' work has quite unjustly been denigrated as having neglected ... inflationary expectations ... Ironically, the most frequently discussed equilibrium in this 1954 'expectations-augmented Phillips curve' was at stable product prices". Chapple asserts that this could "suggest to unwary readers - along with contentions that the Friedman-Phelps critique of the curve be called the Friedman-Phelps-Phillips critique - that Phillips was the author of the expectations augmented curve". An unwary reader could be misled by Chapple's truncated quote but not by the original text. The second part of Chapple's quote has been truncated twice so as to falsely attribute to me the position that Phillips and Friedman co-authored the natural-rate model. But the un-truncated quote clearly shows that I was seeking to *distinguish* Phillips' conception from Friedman's: "Ironically, the most frequently discussed equilibrium in this 1954 'expectations-augmented Phillips curve' was at stable product prices whilst in Friedman's subsequent version, long-run natural-rate equilibrium was consistent with any level of price inflation". Chapple also deleted my reference to the distinction in Phillips' work between stabilising and destabilising inflationary expectations.⁶

The textbooks contain three alternatives with respect to the Phillips curve: the original stable-everywhere trade-off; the natural-rate model; or the path dependent critique of the natural-rate model. Within this framework, Chapple offers the following logic:

A3: Leeson argues that Phillips was not the author of the stable high inflation trade-off interpretation (correct).

A4: Leeson argues that Phillips was aware of the destabilising effects of inflationary expectations (correct).

C2: Leeson must therefore be arguing that Phillips was the author of 'that which came next', some variant on the natural-rate model (incorrect).

According to Chapple's logic, if Phillips was not the author of either the natural-rate model or the path dependent hysteresis critique of the natural rate model, by a process of elimination he must be the author of the original trade-off. But there is a fourth alternative: Phillips' stabilisation model. Phillips was a stabilisation theorist who devoted the bulk of his professional life to the formulation of proposals that would minimise

instability. Ill-conceived stabilisation proposals, inflation, inflationary expectations and devaluation were the major sources of instability in Phillips' model. But according to Chapple, if Phillips was not the author of 'what came before' in the textbooks, he must have been the author of 'what came next': a 'linear' view of intellectual "progress".

But those who 'came next' do not share Chapple's faith in the textbook story. Chapple seeks to separate Phillips from "Phillips' Adaptive Inflationary Expectations Formula" which via Cagan (1956, 37), Nerlove (1958, 231) and Arrow and Nerlove (1958, 299) transformed the general analysis of inflation, and which later formed the basis of the Phillips-Friedman-Phelps Critique of the high inflation trade-off. But Cagan (1999) and Nerlove⁷ don't and neither do Friedman and Phelps (1994, 34): Phillips (1958) "was the main paper in getting us to think constructively about the whole supply side of macroeconomic models ... implicit in that paper is a zero inflation equilibrium".

4. The growth essay

According to Chapple (1999) "Once one takes Phillips at his word and accepts that he put forward a stable non-linear trade-off between inflation and unemployment, all else simply follows". Chapple (1998, 76-7) reproduces some equations from one of Phillips' growth essay and asks: "What about inflation? ... Over this range of parameter assumptions Phillips's article articulates a permanent trade-off between inflation and real activity." Defining $x (= Y/Y_n)$ as the ratio of actual output to normal capacity output, Phillips derived the first steady state (x_s) equation:

$$x_s = 1 + (m - \delta)/\beta$$

which relates x_s to m , the proportional rate of change of the quantity of money (which Phillips assumed to be "constant"), plus δ , the rate of change of factor prices, and β , the relationship between x and p . Chapple (1998, 76) asserts that through this equation a higher rate of m raises x_s . Increasing m might increase the numerator ($m - \delta$), in the absence of countervailing changes in δ . But if unemployment fell this would tend to increase both δ and β , leaving the net impact on x_s uncertain. Inflation may raise or lower the steady state rate of capacity output. So much for Chapple's assertion about this being "the classic Phillips curve trade-off!"

Phillips (1961, 365) divided his curve into three zones. At the beginning of the zone of "catastrophic" (4-5%) unemployment the value of β "might be as low as 0.1"; in the "runaway inflation" zone it would be higher than unity. Between these two dysfunctional zones, in the "compromise" zone (1.5-2.5% unemployment) β was "perhaps a little below unity".

Phillips (1961, 364, equation 22, 366) defined the proportional rate of change, p , of the price level as: $p = D \log P$ "where D is the differential operator d/dt ". He then stated that the steady state solutions "may be obtained by putting D equal to zero". y_{ns} and x_s are easily derivable from Phillips' equation (25); wherever his p_s equation came from, the discussion that followed related exclusively to zero inflation: "If $m = y_{ns}$ the price level is constant in conditions of steady growth ... the maintenance of normal capacity output is consistent with a constant price level only if $\delta = sv$ ". Since δ was "the rate at which factor prices would change if actual output were equal to normal capacity output" and sv was assumed to be approximately 0.025 (a savings rate of 0.1 multiplied by an output-capital ratio of 0.25), Phillips was re-stating the conclusion of his empirical work: normal capacity output (and approximately zero inflation) were consistent with an unemployment rate "a little under 2½ per cent" (1958, 299).

Textual evidence notwithstanding, Chapple presents his own steady state equation:

$$p[sic] = m - [1 + sv(m - \delta)/\beta]$$

as "the reduced form for inflation in the steady state" concluding that the "impact [of demand] on inflation is thus theoretically indeterminate". Chapple claims that by plugging in Phillips' "reasonable" empirical values into this equation "a rise in demand growth both raises capacity utilisation and increases inflation - the classic trade-off model in a growth context." But plugging these values into Chapple's equation produces the following result: $p_s = 0.975m + 0.025\delta - 0.025$. The impact of δ on p_s (when multiplied by 0.025) is tiny. Chapple's equation then reduces to a relationship between p_s and m which is exactly how Phillips (1961, 366, 365, n2) described his inflation equation: "in accordance with an obvious extension of the classical quantity theory of money, applied to the growth equilibrium path of a steadily expanding economy".⁸ Chapple explains that Phillips is simply wrong about his own model: "This is hardly the classic quantity theory of money; rather it is the classic Phillips curve trade-off!" So much for taking Phillips "at his word".

In a classic quantity theory model, the very idea of an aggregate demand curve is ambiguous. Chapple (1998, 84, n4) claims that "Phillips adapts the static IS-LM model with a simple Phillips curve and a given nominal money supply...". But exchange rate fixity severely constrains monetary policy, constraining also the possibility of inflation differentials. An aggregate demand curve is conventionally derived by performing the thought experiment of allowing the price level to vary while holding the nominal stock of money constant. If the price level rises (it is not clear how this would occur in a quantity theory model with a given nominal money supply), this shifts the LM curve inwards, resulting in a new equilibrium at a lower level of output. But is this a quantity theory equilibrium? A more likely outcome is that the quantity theory aggregate demand curve would collapse to a point (consistent with the real money supply) allowing only temporary departures from that point (caused by temporary disturbances to the M/P ratio), and permanent shifts of the point (or range) caused by economic growth.

With exchange rate fixity the domestic money supply, and hence the inflation rate, are endogenously determined; the trade-off operates only within a narrow low inflation band. This is exactly how Phillips (1961, 365) described the limits of his model. Phillips explained that he was only "interested" in ranges of values in which actual output (Y) fluctuates around capacity output (Y_n) by a maximum of 5%: "In order to reduce the model with money, interest and prices to linear differential equations in x , y_n and p it is necessary to express $\log Y \dots$ in terms of $\log Y_n$ and x . For this purpose we shall use the approximation

$$\begin{aligned} \log Y &\cong \log Y_n + (Y - Y_n)/Y_n \\ &= \log Y_n + x - 1 \end{aligned}$$

The approximation is very good over the range of values of $(Y - Y_n)/Y_n$, say from -0.05 to 0.05, in which we are interested [emphasis added]. Since Phillips (1961, 361) stated that these output fluctuations were "five times as large as the corresponding fluctuations in the proportion of the labour force employed", this clearly indicates that Phillips limited his analysis to outcomes in the compromise zone of plus or minus 1 percentage point unemployment from normal capacity output.

5. Conclusion

Phillips (1958, 283-4) listed the assumptions which underpinned his curve. As inflation took off, many of these assumptions broke down: the value of imports rose above the assumed level of 20% of national income; productivity growth fell below the assumed

value of 2%; wages and import prices both rose faster than 3%, and retail prices rose faster than 1%. Phillips (1954, 307; 1958, 292) stated that the location of his curve was dependent upon the strength and aggression of the factors of production: "the stronger and more aggressive" the trade unions, the further to the stagflationary right his curve would be located. The demand for trade union organisation and aggression is a derived demand; derived from the desire to protect real wages. Nominal wages were assumed to rise three times faster than prices, but if price inflation exceeded wage inflation this would initiate a "wage-price spiral".⁹ The mechanism that Phillips (1958, 284) outlined was the situation where "retail prices are forced up by a very rapid rise in import prices". Devaluation raises the domestic cost of imports (it imports inflation as it exports unemployment). As the price of imported oil skyrocketed and the external value of the pound (1970-80) fell by 30%, the average rate of UK price inflation (1973-80) rose to 15% and wage inflation averaged 17%. After 1975, the British economy moved down a new Phillips curve until unemployment exceeded 13% in 1983.

Sterling entered the Bretton Woods system at \$4.03 to the pound. In 1975-6, as inflation exceeded 26% and unemployment rose, sterling fell below \$1.60. Was this a failure of Phillips' curve, or a failure to recognise the upper limits of his "compromise solution"? The evidence strongly supports the later interpretation. If there were not implicitly three zones to Phillips' curve, then there must have been two Phillips. He was the pre-eminent stabilisation theorist of his generation who developed a Phillips Critique years before Lucas; his major contribution was to demonstrate the destabilising tendencies of most stabilisation proposals. Was he also a Jekyll and Hyde character with a naïve belief in permanently high adverse inflation differentials as a permanent cure for unemployment? Did he regard the analysis of inflationary expectations as essential in his own theoretical Phillips curve and in other people's empirical work but not in his own empirical Phillips curve? Or were his empirical stabilisation proposals premised on the belief that British policy makers would not allow inflation (and therefore inflationary expectations) to enter and remain in the non-trivial zone? The three-zone interpretation is consistent with Phillips' writings; the one-zone-two-Phillips interpretation is not.

Chapple's textbook impression is without factual foundations and is contradicted both by Phillips' writings and by the memories of those involved. The "Big Trade-off" interpretation of Phillips' curve is one of the Big Myths of modern economics. Nevertheless, Chapple has performed a useful function in stimulating this exchange and thereby strengthening our understanding that Phillips' proposals were exclusively designed for the low or zero inflation "compromise" zone.

* Economics Department, Murdoch University, WA 6150.

Notes

¹ Richard Watson and two anonymous referees are thanked for comments.

² Chapple (1998, 79) misquotes Phillips' (1958, 290) discussion of the averaging procedure underpinning the six crosses ("if unemployment would be [sic] held constant at this [sic] level") and asserts that Phillips was describing "the equilibrium nature of his curve". But Chapple neglects to report that the highest cross occurs at about 5% wage inflation and 3% price inflation. Thus, even if Phillips was discussing policy rather than the econometric procedures by which he derived his curve (which he was not) the average crosses tell us nothing about the runaway inflation zone.

³ Chapple (1998, 82) also misquotes Phillips as stating that outcomes in excess of the stagflation-inducing "critical value" of imports only "occurs [sic] very rarely except as a result of war". Phillips' (1958, 299) argued that 2.5% unemployment might deliver zero inflation (assuming productivity growth at 2%); a qualified prediction conditional on the absence of stagflation ("Ignoring years in which import prices rise rapidly enough to initiate a wage-price spiral, which seem to occur [emphasis added] very rarely except as

a result of war"). This is a tentative description of British economic history not a dogmatic statement of universal validity, which Phillips (1962) later amended to allow a greater role to these cost-push forces.

⁴ Chapple apparently believes that economic theory when specified for the purposes of econometric estimation becomes "ad hoc" as soon as it is estimated.

⁵ On Phillips' behalf, Chapple (1998, 84, n9, 80) implicitly asserts that any inflation differential is a problem that "is remedial via a simple technical solution involving some limited flexibility in exchange rates ... a practical issue". But permanent inflation differentials would require permanent exchange rate adjustments in violation of the Bretton Woods commitment to "exchange stability". Phillips' trade-off must be viewed in the context of this post-war commitment to exchange stability with the possibility of only minor and very occasional adjustment. This reluctance to alter rates applied to both devaluation and revaluation.

⁶ "In outlining his model [Phillips] discussed a feedback mechanism: 'If changing prices induce expectations about future price changes in the same direction, as will probably be the case after fairly rapid and prolonged movement, demand will change in the same direction as changing prices ... and there will be a positive feed-back tending to intensify the error, the response of demand to changing prices then acting as a kind of perverse or destabilising mechanism of the proportional type' (1954, 311). If, on the other hand, it is expected that the price level will return to the 'level ruling in the recent past' (1954, 311), the feedback will be negative, and contribute towards the 'Inherent Regulation of the System'".

⁷ "The history of the idea [of adaptive expectations] is unclear: A.W. Phillips may have suggested the idea to M. Friedman about 1950" (Nerlove *et al.* 1979, 296).

⁸ His steady state rate of interest, r_s ("the real rate of interest in Fisher's sense, i.e., as the money rate of interest minus the expected rate of change of the price level") was also "independent of the absolute quantity of money, again in accordance with classical theory." Phillips stated that his interest rate function was "only suitable for a limited range of variation of YP/M ".

⁹ According to Chapple (1998, 80) there "is no description in Phillips (1959, 4) of a wage-price spiral". There are, however, four references to a wage-price spiral on that page.

References

- Arrow, K.J. and Nerlove, M. 1958. A Note on Expectations and Stability. *Econometrica* 26: 297-305.
- Bruce-Gardyne, J. and Lawson, N. 1976. *The Power Game*. London: Macmillan.
- Cagan, P. 1956. The monetary dynamics of hyperinflation. In Friedman ed.
- _____. 1999. Phillips' Adaptive Inflationary Expectations Formula. In Leeson ed.
- Chapple, S. 1996. Phillips and the inflation-unemployment trade-off. *New Zealand Economic Papers* 30 (2): 219-228.
- _____. 1998. Bill Phillips's Big Trade-Off. *History of Economics Review* 28, Summer: 72-86.
- _____. 1999. The Challenge on Phillips. Penultimate Draft.
- Crosland, S. 1982. *Tony Crosland*. London: Jonathan Cape.
- Davis, W. 1968. *Three Years Hard Labour: The Road to Devaluation*. London: Andre Deutsch.
- Friedman, M. 1956. ed. *Studies in the Quantity Theory of Money*. Chicago: University of Chicago Press.
- Friedman, M. 1968. The Role of Monetary Policy. *American Economic Review* LVIII.1, March: 1-17.
- _____. 1988. A Proposal for Resolving the US Balance of Payments Problem: Confidential Memorandum to President-elect Richard Nixon. In Melamed ed.
- Foot, P. 1968. *The Politics of Harold Wilson*. England: Penguin.
- Jenkins, Roy. 1991. *A Life at the Centre*. London: Macmillan.
- Kendal, M. ed. 1968. *Mathematical Model Building in Economics and Industry*. London: Charles Griffin.
- The League of Nations. 1944. *International Currency Experience: Lessons of the Inter-War Period*. Princeton, NJ: League of Nations Publications.

- Leeson, R. 1994. A.W.H. Phillips, M.B.E. (Military Division). *Economic Journal* May, 104: 424: 605-18.
- _____ 1997a. The Trade of Interpretation of Phillips' Dynamic Stabilisation Exercise. *Economica*. February, 64.253: 155-173.
- _____ 1997b. Phillips, Inflationary Expectations and the Unemployment - Reducing Inflation Tradeoff: Reply to Chappell. *New Zealand Economic Papers*, June, 31 (1): 49-63.
- _____ 1999. Ed. A.W.H. Phillips: *Collected Works in Contemporary Perspective*. Cambridge: Cambridge University Press.
- Melamed, L. ed. 1988. *The Merits of Flexible Exchange Rates: An Anthology*. Fairfax, VA: George Mason University Press.
- Nerlove, M. 1958. Adaptive expectations and the cobweb phenomena. *Quarterly Journal of Economics* 72: 227-240.
- Nerlove, M, Grether, D.M. and Carvalho, J.L. 1979. *Analysis of Economic Time Series: A Synthesis*. New York: Academic Press.
- Phelps, E. 1967. 1994. Edmund Phelps. In Snowdon *et al.*
- Phelps Brown, E.H. 1969. Balancing External Payments by Adjusting Domestic Income. *Australian Economic Papers* 45.110, June: 111-121.
- Phillips, A.W. 1954. Stabilisation Policy in a Closed Economy. *Economic Journal* June: 290-323.
- _____ 1956. Some Notes on the Estimation of Time-Forms of Reactions in Interdependent Dynamic Systems. *Economica* May: 99-113.
- _____ 1958. The Relationship Between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom, 1861-1957. *Economica* November, 25: 283-99.
- _____ 1959. Wage Changes and Unemployment in Australia 1947-58. Economics Monograph No. 219, Economic Society of Australia and New Zealand, New South Wales Branch. Reprinted in Leeson 1999.
- _____ 1961. A Simple Model of Employment, Money and Prices in a Growing Economy. *Economica* November: 360-370.
- _____ 1962. Employment, Inflation and Growth. *Economica* February, 29: 1-16.
- _____ 1968. Models for the Control of Economic Fluctuations. In Kendal ed.
- Snowdon, B, Vane, H. and Wynarczyk, P. 1994. *A Modern Guide to Macroeconomics: An Introduction to Competing Schools of Thought*. Edward Elgar: England.
- Wilson, H. 1971. *The Labour Government, 1964-1970*. Middlesex: Penguin.