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BY

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Cambridge Anticipations of the Natural Rate Hypothesis? Robertson and Champernowne Revisited

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Abstract. The "natural rate hypothesis" is usually ascribed to ideas put forward by M. Friedman and E. Phelps between 1966 and 1968. It postulates that changes in nominal aggregate demand affect aggregate output because agents cannot temporarily distinguish relative from general price movements when they face imperfect information. This paper shows how some of its key conceptions may be found in contributions by Cambridge economists D.H. Robertson and D.G. Champernowne advanced in the 1930s as critical responses to J.M. Keynes's *General Theory*. Robertson and Champernowne devised the concepts of "normal" and "basic" unemployment rates respectively, expressed as equilibrium positions when workers' real wage expectations are satisfied. Robertson combined that with his previous discussion of monetary misperceptions, whereas Champernowne argued how equilibrium may be achieved through inflation/deflation acceleration. Unemployment homes in on its "natural" equilibrium level only if the market rate of interest converges to its (Wicksellian) natural rate, as Robertson stressed.

Key words. Natural rate hypothesis, Robertson, Champernowne, basic unemployment, normal output, acceleration

JEL classification. B22, B30, E31, E32

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Is there, or is there not, in considering the relation between monetary phenomena and general economic activity, anything in the notion that there is a certain state of affairs which is to be regarded as "normal", while every other state of affairs is to be regarded as a deviation from the normal, either by way of excess or defect? (Robertson 1938, p. 9)

[T]he amount of basic unemployment is that amount for which the supply price of labour is equal to the demand price for it, whereby the supply price of labour we mean the real wage which labour would demand (at any given level of unemployment) if its demands were not warped by any recent changes in the cost of living … We should expect that … the actual level of unemployment would oscillate above and below the level of basic unemployment. (Champernowne 1936, p. 206)

1. Natural rate connections

While reflecting about the 25 years of the "natural rate hypothesis", Edmund Phelps (1995, p. 17) recalled how his "effort at a theoretical understanding of the Phillips curve began in earnest over the summer of 1966 in the Sidgwick Avenue building at Cambridge", where he spent part of his sabbatical leave from Yale. Rod Cross (1995, p. 2), in his editorial introduction, found it "ironical enough" that Phelps initiated his theoretical criticism of the Phillips curve and formulation of the natural rate of unemployment model during a visit to Cambridge University. The irony, of course, is that the natural rate hypothesis, independently advanced by Phelps (1967, 1968) and Milton Friedman (1966, 1968) and further elaborated by Robert Lucas (1972), on the assumption that agents' decisions depend on (perceived) relative prices only, challenged Cambridge economist J.M. Keynes's (1936) claim that unemployment was determined by effective demand and its policy implication that macroeconomic demand management could target any chosen level of activity (Phelps 1995, p. 15). In fact, as Phelps (2017, p. 2) recently recollected, "I was one of the rebels of the 60's who rejected the macroeconomics we were taught in the 1950's – the 'Keynesian' theory developed by Hicks, Phillips and Tobin" that everything was driven by

aggregate demand, which Phelps contrasted with the "basic economic" principles he had learned from Marshall, Wicksell and Solow that "everything was driven by structural [real] forces". Milton Friedman (b. 1912; d. 2006), as it is well known, had been a leading opponent of Keynesian macroeconomics and (unlike Phelps) a supporter of the quantity theory of money since the 1950s (see Nelson 2018).

However, it is not so ironical that Cambridge should be the birthplace of Phelps's natural rate unemployment model. Cambridge economists Dennis H. Robertson (b. 1890; d. 1963) and David G. Champernowne (b. 1912; d. 2000) had put forward in the 1930s the concepts of "normal level of activity" and "basic unemployment", respectively, as part of their critical reactions to Keynes's *General Theory* (Boianovsky and Presley 2009; Boianovsky 2005). Just like Friedman's (1968) "natural" and Phelps's (1967, 1968) "equilibrium" (or "warranted", as he preferred to call it after 1978) unemployment, Champernowne's "basic" and Robertson's "normal" employment differed from Keynes's (1936) notion of full employment as a fixed upper limit. Instead, they referred to oscillations around a long-run equilibrium employment level at which price expectations of workers and firms are confirmed. Moreover, Phelps's (1968) focus on unemployment as search phenomenon may in part be traced to his reading of Cambridge economist Joan V. Robinson (1937, chapter 2 on "Mobility of labour"), who had argued, as a criticism of chapter 2 of the *General Theory*, that frictional or search unemployment is not independent of aggregate demand – a point that she might have discussed with Phelps during his 1966 Cambridge visit (see Boianovsky 2005, pp. 80-81). Indeed, Phelps (1968) referred to Robinson's *Essays* while pointing out that Keynes (1936) lacked the notion that a high (but below "full") employment level could be associated with a positive rate of change of money-wages and prices – that is, the idea of a Phillips curve (Phillips 1958).

As frequently acknowledged by Phelps (e.g. 1968, p. 682; 1995, p. 16), the concept of the natural rate of unemployment – in the sense that inflation is neutral for the equilibrium path of employment and output, when changes in the price level are fully anticipated by workers and firms – was around before his and Friedman's papers canonized it in terms of a vertical long-run Phillips curve. Phelps referred to contributions made during the 1950s debates about inflation, especially by William Fellner, "a greater teacher" of his in Yale at the time. Historians of thought (Niehans 1990, p. 504; Young, Leeson and Darity 2004, p. 115; Boianovsky and Trautwein

2006, section 6; Boianovsky and Presley 2009, section 5; and particularly Forder 2010, 2014 chapter 4.1) have confirmed that the point about the absence of a lasting trade-off between inflation and unemployment (sometimes called the "expectations critique") was conspicuous in the economic literature of the 1950s and early 1960s, including some works by Friedman ([1958] 1969; [1963] 1968).

Actually, the point had been made much earlier by Knut Wicksell, in his classic *Interest and Prices*, regarded by some the foundational work of monetary macroeconomics. Wicksell reacted against the view that slowly steadily rising prices were preferable to price stability because they would encourage enterprise and economic activity permanently. According to Wicksell ([1898] 1936, p. 3), "if a gradual rise in prices, in accordance with an approximately known schedule, could be reckoned on with certainty, it would be taken into account in all current business contracts; with the result that its supposed beneficial influence would necessarily be reduced to a minimum" (see also Woodford 2003, p. 9, n. 4, who quotes from the rest of Wicksell's passage and notices its similarity with the natural rate concept). Wicksell ([1906] 1935, p. 129) repeated the criticism in his *Lectures*, adding that, in order to bring about positive effects on output, "what is contemplated is, therefore, unforeseen rises in prices". Wicksell's remarks bring up the issue of disequilibrium short-run dynamics, tackled in his famous cumulative process of price change mentioned in Friedman's (1968) presidential address. Unlike Friedman (and Cambridge economists, for that matter), however, Wicksell ([1898] 1936) was mainly concerned with cumulative changes in nominal variables, with only limited discussion of fluctuations in employment and output.[1]

Friedman's (1966, 1968) and Phelps's (1967, 1968) objections to the Phillips curve were theoretical, not empirical. Econometric estimates of the relation between the rate of change in nominal wages (or prices) and unemployment performed relatively well in the 1960s, largely duplicating the nonlinear inverse "successful" fitting of British historical data by Phillips (Phelps 1968, p. 680; Friedman 1977, p. 455). Indeed, a main purpose of Friedman and Phelps was to "reconcile" the empirical Phillips curve with the "neutrality axiom of anticipated inflation", as put by Phelps (1968, p. 682). They did that by arguing that the Phillips curve shifts upward with the

[1] Wicksell used the term "normal" rate of unemployment to describe labour market equilibrium as a search phenomenon in Swedish newspaper articles and pamphlets in the early 1900s, but not in his books (Jonung 1986; Boianovsky and Trautwein 2003).

expected rate of increase of prices (or wages), accompanied by convergence of actual unemployment to its "natural" or long run level. Following the 1950s inflation debates in the US and the UK, they developed the argument mainly for inflationary economies featuring excess demand, with restricted attention to deflations and recessions. Whereas the "expectations critique" gradually gained general assent, the short-run dynamics and convergence ("home in") to the natural rate path with clearing of all markets proved to be more problematic. As pointed out by William Nordhaus (1970, pp. 9-11) and later endorsed by Phelps (1995, pp. 22, 28), there is a distinction between the long-run proposition about expectations (the "natural rate *concept*") and the notion that the price-adjustment mechanism is completely responsive to fully anticipated inflation, leading to a natural rate of unemployment associated to market clearing in the long-run. Phelps (1995, p. 22) would maintain that the "natural rate *hypothesis*" consisted essentially of the second proposition, which emphasized the homing in mechanism and assumed away persistent non-equilibrium paths.

That distinction is behind the notion of "non-accelerating inflation rate of unemployment" (NAIRU), introduced in the mid 1970s by F. Modigliani, J. Tobin and other Keynesian economists who did not accept the "natural rate hypothesis" as defined above. In a similar way, Don Patinkin (1991, pp. 21-22) accepted the natural rate concept, but not the hypothesis. Phelps (1967, 1968), however, lacked a demonstration of the crucial proposition that the economy will ultimately and automatically gravitate to the natural rate of unemployment (particularly if coming from above equilibrium rates), which is only implicit in his framework (Howitt 2007, pp. 210-11). Indeed, the difficulties involved in convergence to full employment general equilibrium was the theme of "disequilibrium macroeconomics", fashionable at the time of inception of the natural rate hypothesis, as investigated by Patinkin, Robert Clower, Axel Leijonhufvud, Herschel Grossman, Robert Barro and others (see Backhouse and Boianovsky 2013). As observed by Howitt (op. cit.), Phelps avoided those problems by investigating what the rate of unemployment would be *if* the economy converged to its long-run equilibrium, and what would happen to employment if the central bank managed to keep actual unemployment temporarily below its natural level (that is, "optimal inflation" and "optimal employment" policies).

That is probably the reason why Phelps (1979, p. 91; 2017) eventually decided to deploy the term "warranted" unemployment rate, borrowed from Roy Harrod's

(1939) well-known concept of the warranted rate as the prevailing rate of growth *if* the economy is on its equilibrium path with entrepreneurs' expectations confirmed. Phelps's reference to Harrod reflected his background as a growth economist who contributed to optimal capital accumulation theory in the early 1960s (see Dimand 2008). Indeed, Phelps (1967) used optimal control theory in his study of the optimal path of employment over time, as he did in his optimal growth papers. The novelty of his argument, Phelps (1967) claimed, did not lye in the influence of expected inflation or even in the idea of an equilibrium rate of unemployment, but in devising a dynamic model of optimal employment by taking into account the exploitation of the short-run Phillips curve trade-off and its gradual convergence to long-run equilibrium (see Backhouse and Boianovsky 2013, pp. 88-89). Phelps (1972, p. xii) would elaborate further and refer to D.H. Robertson as a main source of inspiration of the grand theme of "optimum *steady* inflation" (Phelps 1972, p. xii).

Instead of Harrod, Friedman's (1966, 1968) "natural rate of unemployment" was inspired by Wicksell's ([1898] 1936) "natural rate of interest", which provided a benchmark to separate (temporary) monetary from (permanent) real influences in the determination of both "natural" rates.[2] Friedman's mention of Wicksell suggests at first glance that his 1968 argument pertained to the long Wicksellian macroeconomic saving-investment tradition, based on failures of the interest mechanism to coordinate intertemporal economic decisions. However, Friedman did not belong to what Leijonhufvud (1981) has called the "Wicksell connection". Indeed, as argued by Leijonhufvud (op. cit.) in his critical examination of the natural rate hypothesis, missing from Friedman (1966, 1968) is the notion that unemployment will not home in on its natural level unless the rate of interest converges to its natural Wicksellian level, with saving and investment equal at "full employment" income.

Like Friedman's and Phelps's natural and warranted rates, Robertson and Champernowne devised the concepts of "normal" and "basic" unemployment as equilibrium positions corresponding to the confirmation of workers' real wage expectations. However, the two Cambridge economists, reflecting macroeconomic debates of the inter-war period, were primarily concerned with the conditions under which homing in on equilibrium unemployment would take place through the interest

[2] Harrod (1939), of course, created as well the concept of "natural growth rate" to describe the full-employment growth path, but with a meaning distinct from Friedman's "natural".

mechanism. Champernowne (1936) discussed how equilibrium may be reached through inflation/deflation acceleration processes that prompt changes of the interest rate by central banks. Robertson (1938) examined how workers' reactions to "forced saving" caused by unanticipated inflation may prevent the employment determination through sheer expansion of monetary demand. Robertson's "normal" employment was a feature of monetary equilibrium, when the interest rate is at its Wicksellian "natural" level – a concept rejected by Keynes (1936).

In the post-war period Robertson ([1949] 1952; [1955] 1956) became increasingly critical of the "Keynesian" "full employment pledge" as the dominant policy goal and concerned about the risks of inflation acceleration under a "cheap money" regime, as witnessed by his participation in the well-known 1957-58 British "Council on Prices, Productivity & Incomes", and by his Cambridge lectures (delivered between 1946 and 1957 and originally published in three volumes in 1957-59, with a 1963 paperback single volume edition). It was in that context that Robertson ([1959] 1992] reacted with some skepticism to Phillips's (1958) estimation of a secular stable relation between money-wages changes and unemployment. Unlike Friedman and Phelps, however, Robertson did not charge Phillips for relating the rate of unemployment to changes in nominal instead of real wages. Champernowne (1959), who wrote little about macroeconomics after his 1936 article (see Boianovsky 2017), criticized the statistical treatment by Dicks-Mireaux and Dow (1959) – one of the "Phillips curve" like exercises at the time – of the impact of cost of living changes on money-wages dynamics.

Friedman spent the 1953-54 academic year in Cambridge (UK), his first long period abroad. He then attended the weekly seminar of the Political Economy Club run by Robertson, described as the "intellectual leader of the smaller 'conservative' or non-Keynesian faction" of the department of economics, dominated by J.V. Robinson, Nicholas Kaldor and R.F. Kahn (Friedman (1998, p. 247). In his opinion, Robertson was a "brilliant economic theorist" whose book on *Money* "remains one of the most lucid and profound presentations of the central principles of monetary theory" (Friedman, ibid). Friedman did not meet Champernowne on that occasion, as the English economist worked in Oxford from 1945 until 1959, when he moved back to Cambridge (see Boianovsky 2017). However, as discussed below, the likelihood

that he read and was influenced by Champernowne (1936), not to mention Robertson's articles and books, should not be underestimated.[3]

2. Champernowne's basic unemployment rate

Expectations played an important role in the explanation of economic fluctuations during the period of "neoclassical" macroeconomics in Cambridge (F. Lavington, A.C. Pigou) and elsewhere (I. Fisher, Wicksell). Keynes continued that tradition, even though he departed from the Lavington-Pigou view that unemployment was a short-run cyclical disequilibrium phenomenon brought about by incorrect entrepreneurial anticipations. Like those economists, Keynes focused on expectations in assets markets, without dealing in any detail with workers' price expectations and their effects on labour supply decisions and money-wage dynamics. Indeed, for Jevons, Marshall and others, it was not just that workers occasionally held mistaken expectations, but that, unlike businessmen and dealers in the financial and investment markets, they could not foresee at all (see Boianovsky 2019). As put by Marshall,

> But employés [sic] cannot as a rule foresee; and they have less power of acting on their knowledge. The consequence is that a rise in wages is seldom or never as fast as that of prices when the cause of the rise is an increase of the currency, that is not accompanied by an increased command over nature. (Marshall, 1926; minutes of evidence to the 1899 Committee on Indian Currency)

Unlike Marshall and other Cambridge economists, Robertson, in his 1915 *Study* (reprinted in 1948 with a new preface), and especially Champernowne (1936), paid close attention to workers' price anticipations. They brought to the fore the role of expectations, hitherto restricted to *assets* markets, in the working of the *labour* market.

Between 1933 and 1935 Champernowne studied under Keynes's supervision and attended lectures about the forthcoming *General Theory*. That would explain how he was able to have his 1936 review essay published just four months after the book came out. His article was an effort to sort out the differences between Keynesian and

[3] Friedman (1969, p. 1) acknowledged discussion with Robertson on the notion of the "optimum quantity of money", but not in connection with the natural rate hypothesis.

"classical" (Pigouvian) analyses of unemployment. The "fundamental difference", pointed out Champernowne (1936, p. 201), is that, while the former argues that the wage bargains decide the money-wage only, the latter maintains that these bargains succeed in determining the real wage rate. Keynes (1936, p. 30) claimed that it was the level of employment (decided by effective aggregate demand in the output market) that determined the real wages rate, against the classical argument that real wages determined the level of employment (and therefore output) in the labour market.

Champernowne (1936) put forward a general equilibrium aggregative model of an IS-LM type, which highlighted the role of the labour market and pointed to the distinct causality structures of "classical" and "Keynesian" frameworks (see Boianovsky 2005). Champernowne's formulation may be regarded as the first complete portrayal of macroeconomic relations by means of systems of equations and diagrams.[4] As he put it in an interview with Warren Young (1987, p. 83) , the purpose of his paper was to elaborate a "more general system" in which both Keynes's and the classical systems were seen as "special cases" of his own "more general approach". A main contribution of the paper was its "rationalization" (or, as we would say nowadays, "modelling") of the "classical apparatus" for determining the trends of real wages, unemployment, prices and rate of interest (Champernowne 1936, p. 201). He used the term "trend" in the sense of the long-run average value of a variable.

Keynes's "first wave of attack" on the classical system, according to Champernowne, consisted of the claim that workers will resist a decrease of money-wages but will not withdraw their labour supply whenever the cost of living goes up (cf. Keynes 1936, p. 9), so that "labour's policy with regard to the level of real wages can always be neutralised by changes in the cost of living" (Champernowne, p. 202). Workers' concern with money-wages (and relative wages) rather than real-wages, however, should be regarded as a short-run "temporary phenomenon" only, as remarked Champernowne (ibid), with acknowledgement of discussions with Robertson.

The money-wage demanded by a worker today is such that would give him a certain standard of living at prices running in a previous date, postulated Champernowne (p. 203). The observed lagged reaction to changes in the cost of living

[4] With the possible exception of Ragnar Frisch's pre-Keynesian 1933 macro-dynamic business cycle model, built for different purposes.

was explained by the existence of wage contracts "based on the expectation of a stationary cost of living", transaction costs involved in contract changes, limited information about price changes, and "the habit of thinking in terms of the price level of some earlier date". All such factors would be removed in time (Champernowne, ibid). The contractual set up is such that wages are set in nominal terms for a given period; when they are set, the relevant price level is not known yet, which means that money-wages depend on the *expected* price level.

This is close to the model of "contractually rigid wages" found in modern macroeconomics, which assumes that the wage bargain between firms and workers takes place before they know the price level ruling when the contract is in force. The nominal wage set in the bargain is equal to a target real wage (ω) times the expected price level: $W = \omega \, . \, P^e$, so that $\frac{W}{P} = \omega \, . \, \frac{P^e}{P}$ (see e.g. Mankiw 1992, chapter 11.1). The actual real wage rate will be higher than the target real wage when the current price level is lower than the expected level, and vice versa. Champernowne (p. 203) named the real wage that workers would demand if $P = P^e$ the "basic real wage". It is implicit that labour demand (determined according to diminishing marginal productivity of labour) decides the employment level, as the contract between workers and firms does not set employment in advance. Workers agree to supply the amount of labour demanded by firms at a predetermined wage rate (cf. Mankiw, op. cit.). The labour market will be in equilibrium at its "basic unemployment" rate when each worker demands his "basic" real wage.

Champernowne did not refer to employers' price expectations. Since he writes the "Keynesian" labour supply and labour demand functions respectively as N_s *(Rw)* and N_d *(R)*, where *R* is the real wage rate, he seems to assume that firms have all the necessary information about the prices of their own goods, whereas workers face the more difficult task of deflating their money-wages by a cost of living index composed of several goods [see Champernowne, p. 211; but cf. p. 214, where he writes N_d *(Rw)*]. That would explain the notion of asymmetric information between firms and workers. "Classical" labour supply and labour demand functions are expressed by N_s *(R)* and N_d *(R)*, under the (implicit) assumption of correct adjustment of P^e to *P* by workers and firms alike. In Champernowne's pure "Keynesian" system there is no adjustment at all of P^e to P by workers, whereas in the intermediary imperfect

foresight case (that is, Champernowne's own preferred model) expectations adjust imperfectly to changes in the price level (see also Branson 1979, chapter 6).

In Champernowne's framework, departures of the actual unemployment rate from its "basic" reference level are, therefore, determined by (unanticipated) inflation or deflation. If the cost of living has been rising, actual unemployment will be less than basic unemployment by a magnitude called "monetary employment", and vice-versa for "monetary unemployment". In a footnote, Champernowne (p. 204, n. 1) observed that "the concept of monetary unemployment is copied from Keynes's 'involuntary unemployment' … but differs from that concept". Unlike Keynes's involuntary unemployment, it did not describe points off the labour supply curve with excess labour supply. Indeed, Champernowne's (p. 211) equation for the "Keynesian" labour market reads as an equilibrium relation $N = N_d\ (R) = N_s\ (Rw)$. In a letter to Joan Robinson of 17 April 1936, Champernowne explained that "what I want to discuss is how long you can expect the worker to overlook a rise in the cost of living or a fall in it; in order to do this I abandon involuntary unemployment and talk about monetary unemployment, which means unemployment due to the fact that workers behave as though the cost of living were higher than it is" (Joan Robinson Papers, King's College, Cambridge; quoted also in Boianovsky 2005, p. 77).

Champernowne's "basic" unemployment is akin to the "natural" rate concept, and consistent with the notion of a short-run aggregate supply function of the form $Y = \bar{Y} + \alpha(P - P^e)$, where Y and $\bar{Y}$ are actual and natural outputs respectively.[5] Insofar as workers' oversights concerning changes in prices are "likely to be repaired eventually", the monetary-unemployed are likely to diminish their money-wage demand and the monetary-employed are likely to raise it. Hence, periods of monetary employment and monetary unemployment are associated to rising and falling money-wages, respectively, which gives Champernowne's (p. 204) short-run Phillips curve like relation.

However, such changes in money-wages will only take the economy to its basic unemployment path if they cause corresponding movements in *real* wages,

[5] Champernowne's argument, expressed in terms of price levels, can be also formulated in terms of inflation rates (π) if differences in the form $P - P_{-1}$ and $P^e - P_{-1}$ are introduced, so that the aggregate supply equation may accordingly be rewritten as $Y = \bar{Y} + \alpha(\pi - \pi^e)$. See, e.g., Mankiw 1992, chapter 11.2. However, Champernowne did not extend his concept of basic unemployment to the case of correctly anticipated inflation (instead of the price level).

which brings in the aggregate demand side of the model. This is related to Keynes's (1936, p. 13) "more fundamental" objection to classical economics that labour as a whole cannot reduce its *real* wage by making revised *money* bargains with firms. Champernowne (p. 204) found Keynes's "second wave" of attack convincing in its contention that drops in money-wages will only bring about corresponding reductions in real wages if aggregate demand increases in the process, presumably via falls in the rate of interest. Champernowne generalized that argument to money-wage increases as well.

The matter was discussed in chapter 19 of the *General Theory*, where Keynes maintained that money-wage reductions might increase employment (and by that reduce real wages) by diminishing the interest rate through their positive impact on real liquidity (the so-called "Keynes effect"). That may be depicted as a downward shift of the LM curve caused by the reduction of the price level for a given money supply. Champernowne's 1936 "Keynesian" model, however, postulated that central banks set the rate of interest instead of controlling the money supply (a horizontal LM curve) – an idea Champernowne (p. 212; but cf. p. 214, bottom) sometimes associated to Keynes, although it is much closer to Wicksell's *Interest and Prices* than to the *General Theory*.

Instead of the "Keynes effect", Champernowne discussed how inflation and deflation acceleration would prompt central banks to change the rate of interest in order to stabilize the price level and bring the economy to long-run equilibrium. "I think everybody is a bit puzzled about how to use Keynes's book in studying a long run", he wrote to Joan Robinson on 2 April 1936. In his letter, Champernowne argued for "a more sophisticated definition of equilibrium" as "a state of affairs in which some particular tendency has worked itself out completely". A tendency relevant for his purposes was "the tendency for there to be an expansion of credit when there is a lot of unemployment, and a contraction of it when there is a boom; then there will be equilibrium when there is just a little unemployment" (quoted also in Boianovsky 2005, p. 84).

When the rate of unemployment is below its "basic" equilibrium level, money-wages increase and, unless real wages increase as well, prices will rise in the same proportion, with another round of rise of money-wages and so forth. The workers' "bargaining power" goes up and the pace of revision of money-wage demands will become faster as they get "more accustomed" to the effects of inflation

on real wages – that is, as they revise their price level expectations in adaptive fashion. Hence, "we see that a period of monetary employment will be accompanied not merely by rising money-wages and prices, but moreover by *money-wages and prices rising at a rapidly increasing rate* (Champernowne, p. 205; italics added). The only way to keep the rate of unemployment below its equilibrium or "basic" level is by increasing the rate of inflation. The monetary authority "would be forced to put a stop to it" by means of a higher rate of interest leading to price stabilization. The deflationary efforts of the central bank would enable workers to get their targeted real wage, but at the "cost of considerable unemployment". Since the action of the central bank is unanticipated, there would probably be an overshooting, with real wages rising "sharply" and the amount of employment falling below its equilibrium level, he claimed.

The argument for the case of "monetary unemployment" is similar: the process of falling money-wages and falling prices "is likely to become accelerated as labour becomes more disorganised by the depression, and as employers get more desperate and more confident in their power to cut money-wages" until eventually the monetary authority reduces the rate of interest and puts an end to the deflationary process. There is no perfect symmetry, though, as the pressure on the central bank to reduce interest rates and stabilize prices and output is not as strong, since agents' "influential opinion" is supposed to be more concerned with the danger of a hyperinflation ("like in Germany") than with the "prospect of a slump 'like they had in America'" (p. 206). This will turn those periods longer than inflationary ones (especially if money-wages are more rigid downwards than upwards).

Champernowne disregarded such asymmetry and assumed, "as a first approximation", that the "trend" (long-run average) value of unemployment is equal to the level of basic unemployment, since actual unemployment rate oscillates "more or less regularly" around its basic value. Hence, "provided that the monetary authority does not allow labour to be misled by too long periods of rising or falling cost of living, the 'real supply curve of labour' may be a useful concept for estimating the *trend* of unemployment, real wages, rate of interest and saving" (p. 216). The interest rate will be at its Wicksellian natural level (a term Champernowne did not use), with saving and investment equal at the trend unemployment rate. Under those assumptions, the real wage is more relevant than the money-wage in deciding the trend of unemployment, and classical Pigouvian analysis applies, even though it is

unable to trace the actual unemployment path. The classical and Keynesian polar models are illustrated in figures 1 and 2 below, with their distinct causal structures. Champernowne, however, did not provide a diagrammatic (or mathematical) representation of his own intermediary dynamic approach.

[Insert figures 1 and 2 here; now at the end of the paper]

3. Robertson on the output effects of price level changes

In correspondence with Warren Young of 14 November 1985 (held in the Champernowne Papers, Marshall Library, Cambridge University) Champernowne remarked that "my stile of writing" in the 1936 piece "is influenced by dim memories of the writings of D. H. Robertson." Robertson's books and articles on business cycles and monetary economics written between 1915 and 1934 attempted to extend and apply to industrial fluctuations Marshall's economics and the Cambridge approach to the quantity theory of money. As Robertson ([1915] 1948, p. 11) stated, a main cause of the obscurity then surrounding the investigation of business cycles was that no use had hitherto been made of the "weapons supplied by this particular intellectual armoury" formed by Marshallian economics. Indeed, Robertson's *Study* was "the first of all attempts to apply systematic economic analysis" to the problem of economic fluctuations (Hicks 1966, p. 11). One of Robertson's key assumptions, made in 1915 and kept ever since, was that, in Marshallian fashion, prices of goods respond immediately to fluctuations in demand and supply. That explains the role in the *Study* of the concept of elasticity of supply of effort of producers in the face of shifting anticipated productivity and technological possibilities, as well as the attention paid to forced, induced and abortive saving from the 1926 *Banking Policy* book (reprinted with a new preface in 1949) onwards (see Presley 1979; Boianovsky and Goodhart 2017).

Again following Marshall, the price flexibility postulate did not extend to the labour market, where downward and upward wage stickiness was postulated as a mater of fact. Robertson's dynamic method, fully developed in his 1933 article, was based on period analysis, also known as the "step-by-step approach". He assumed the existence of a period of time, called a "day", which is finite but nevertheless so short

that the income which an individual receives can only be spent or saved in the next unit period - the "Robertsonian lag". He distinguished between two classes: the "public" (whose rates of money income, because of contract or custom, cannot change during the "day") and the "entrepreneurs" (Robertson, 1933, pp. 399-401; 1948, p. 11).[6] That contractual set up is also behind Champernowne's (1936) treatment of the effects of price changes on employment and output discussed above, although he did not use Robertson's sequence analysis.

Robertson (and Champernwone) parted company with Marshall, though, in the analysis of workers' price expectations and their role in the wage bargain and labour supply decisions, a topic addressed in the final chapters of the *Study*. Robertson (1929) distinguished between three views of the business cycle: the "psychological approach", the "monetary approach", and the notion that instabilities are inherent in the economic process. The third approach dominated Robertson's 1915 and 1926 books. Such fluctuations were explained by (i) the "self-renewing rhythm in real costs of production" associated to changes in productivity caused by output fluctuation in the final stages of depressions and booms; (ii) "variations, due to fluctuations in the bounty of nature, in the amount of agricultural produce offered in exchange for the industrial products"; and, more importantly, (iii) "variations in the intensity of the desire for the fixed instruments of production and transport", that is, discontinuous changes in investment demand because of the high costs and durability of capital goods, and the irregular pace of technical progress (Robertson, op. cit.). According to that view, economic fluctuations and output instability are the unavoidable price paid for economic growth, as Robertson often stressed.[7]

Robertson ([1926] 1949, p. 1) wanted to bring to the fore "*real*, as opposed to monetary or psychological, causes of economic fluctuations". Nevertheless, psychological and (particularly) monetary factors were relevant for causing output movements beyond the "appropriate" point (p. 39). Whereas Pigou's (1912) psychological approach focused on entrepreneurs' errors of forecasting of optimistic

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[6] The first eight chapters of the 1948 final edition of *Money*, Robertson's best-known book, are reproduced from the second revised edition of 1928. Chapters 9 and 10, as well as a new preface, were added in the 1948 edition.

[7] "The phenomena of boom and slump are not primarily a matter of interest rates at all, but of something much more deep-seated, namely, of the inevitable discontinuity which attends the efforts of man to achieve material progress" (Robertson [1937] 1940, p. 126). As Robertson noticed, that was also Wicksell's view.

and pessimist kind, Hawtrey's (1913) monetary perspective regarded the trade cycle the result of price level instability caused by faulty monetary and credit policy. Robertson's discussion of how changes of aggregate monetary demand affected output went beyond Hawtrey's treatment.[8]

According to Robertson ([1915] 1948, pp. 240-41; [1926] 1949, p. 39; 1929, p. 354; 1948, p. 139; [1957-59] 1963, p. 411), the inducements to expand (or contract) output associated to an increased (or diminished) stream of monetary demand are of two distinct kinds: "real" and "illusory", caused respectively by the relative rigidity of money costs in the face of changing prices, and by the misperception – or "miscalculation", as Robertson (p. 242) put it – of changes in absolute prices as alterations in relative prices. Concerning the illusory inducement of rising prices in the boom, he argued that

> An increased volume of currency … will tend, it need hardly be argued, to raise the general level of prices. If all prices (including wages) were equally affected, the result would probably be a general increase of production beyond the point which is in fact most advantageous: for it seems to be a natural tendency of every man to suppose that the product which he sells will be more rapidly and deeply affected by any current price-movements than the products which he buys either for personal consumption or for industrial use. (Robertson [1915] 1948, p. 212)

Unexpected increases in the price level "induces each producer to expect a rise in the exchange value of his own product" (pp. 239-40). Robertson illustrated his argument with a diagram, reproduced below as figure 3. "Units of effort" are measured along the abscissa and "units of utility" along the ordinate. *EE'* is the "curve of marginal disutility of effort", while *AA'* and $A_1A'_1$ are, respectively, the curves of "actual" and "anticipated marginal productivity of effort", prices having risen in the ratio $A_1A : AO$ (pp. 212-13). Because of the effect of the rise in the price level on anticipated marginal productivity, the total volume of effort expended will be *ON*, instead of *OM*, and total utility enjoyed will be *AONR*, which is less than total utility if the marginal productivity of effort had in fact gone up (A_1ONQ), but more

[8] He objected to Hawtrey's support of what became known as the "Treasury View" of the inefficacy of public works in the downturn, when investment demand is depressed (Robertson ([1915] 1948, p. 253).

than total utility at the original equilibrium (*AOMP*). The whole exercise is based on the assumption that the elasticity of demand for income in terms of effort is positive - that is, that the supply curve of effort (from workers and entrepreneurs alike) is positively sloped - which explains why the curve AA' shifts to $A_1A'_1$ when the expected effort price of income falls.

[Insert figure 3 here; now at the end of the paper]

Workers interpret the unexpected uniform rise in money-wages and prices as an *increase* in their purchasing power, whereas entrepreneurs perceive that as a *reduction* in their real production costs. The ensuing increase in aggregate supply and employment is temporary, though. Robertson ([1915] 1948, pp. 217, 240) argued that, as price information spreads, the "producer" realizes that "the rise in prices is not confined to his own product" and the fact of a general rise in the price level is "sooner or later bound to be discovered". Anticipated productivity will fall "till it corresponds with the real productivity of effort, and the volume of production suffers restriction" all the way back to its equilibrium level.

During the downswing, the decline in money and credit supply brings about falling prices, with symmetrical effects on output. "As the divergence between the real and the anticipated productivity of effort operated during the boom to stimulate production, so now it operates to restrain it" (p. 225). It should be noted, however, that the analysis applies to labour demand and to the supply of effort by businessmen only, since Robertson did not describe the decline in employment in the depression as the outcome of a downward shift in labour supply induced by money. He approved of the description of unemployment during the depression as "involuntary" (p. 210), which he explained by the fact that saturation and over-production of capital goods bring about an inelastic effort-demand for *all* commodities, which is higher for businessmen than for workers, since the latter do not demand capital goods.[9] Unlike his discussion of the upswing, it is only implicit that producers will eventually realize that the price fall in the downswing is not restricted to their own products.

[9] In the downswing, workmen "tramp the streets striving to rid themselves of the blessings of Leisure" … "in search of employment" (Robertson [1923] 1931, p. 133; [1926] 1949, p. 21).

"Real" inducements to output changes, provoked by unanticipated price level variations and money-wage stickiness, are not permanent either, as price information comes in and contracts are renegotiated. In the upswing, money-wages will be "screwed up to correspond with the real charges which those who provided [labour] intend to make", and revisions, "in accordance with the rising price level", of workers' wage claims will take place as price expectations are adjusted (Robertson [1915] 1948, pp. 217, 240) – and vice-versa when prices are falling (p. 241).[10] Moreover, the "real" and "illusory" effects may act together, as the eventual fall of money-wages in the downswing "actually enhances the purely monetary and illusory inducements to restriction" (p. 227). Champernowne's 1936 argument about the "basic" real wage rate as an equilibrium variable discussed above is an elaboration of Robertson's "real inducement" effect. Champernowne, however, did not mention the "illusory" effects on effort supply, called "monetary misapprehension" by Robertson (p. 248). This reflected the fact that Robertson in the 1930s and after relied to a much larger extent on the consequences of contractual money-wage stickiness (and its implications for the forced saving process and interest rate determination) than on the analysis of "misapprehension" under flexible money-wages.

Interestingly enough, Robertson's 1915 insight about what is nowadays called "signal extraction problem" is recognizable in Keynes's (1936, pp. 289-90) remarks that the point of full employment may be surpassed, as entrepreneurs are misled by rising prices into increasing output beyond its profit maximization level. "For a time at least", wrote Keynes (p. 290), "rising prices may delude entrepreneurs into increasing employment beyond the level which maximises their individual profits measured in terms of the product". They are "so accustomed" to regard increasing money revenue as a "signal for expanding production", that they may continue to do so even when the increase in revenue is purely nominal, as is the case passed Keynes's point of "full employment". But that was just a "practical" qualification (p. 289). Actually, the notion of monetary misperception goes back to J.S. Mill's 1833 criticism of Thomas Attwood's argument about the positive effects of inflation. According to Mill ([(1833] 1867; quoted from Humphrey 1977, p. 19), this could only

[10] Robertson (pp. 213-15) applied the argument to the rate of interest as well, with reference to Irving Fisher's real interest rate concept and the effects of price expectations on nominal interest. However, he denied that the increase of the Fisherian real rate of interest played an important empirical role in explaining the upper turning point (p. 218).

happen while the rise in prices was "not supposed to be connected with a depreciation of the currency", so that each producer "considered [it] to arise from an increase in the effectual demand for his article", a "delusion" that would eventually vanish as price information came in. Robertson built on Mill's remarks and generalized the analysis to deflation as well. Misperceptions became fashionable again when Lucas (1972) elaborated his surprise supply function, with no reference to the previous literature. Robertson's debate with Keynes after the *General Theory* about "normal" unemployment and the rate of interest involved other arguments, as discussed next.

4. Normal output and the critique of Keynesian economics

Robertson and Keynes collaborated closely since the mid 1910s, as indicated by the correspondence and acknowledgements in their respective books, up to Keynes's 1930 *Treatise on Money*. However, to Keynes's regret, they parted company after the *General Theory*, seen by Robertson as a mistaken detour from the Cambridge tradition in monetary economics (see Presley 1979; Fletcher 2000). The nearly immediate success of the Keynesian revolution upset Robertson and turned him into one of its leading opponents, to such an extent that his own original contributions fell into the background.[11] As Robertson put it in a letter of 31 October 1953 to Thomas Wilson (held in the Robertson Papers, Trinity College, Cambridge), "it will not be easy for *anyone* for another twenty years to produce a positive and constructive [macroeconomic] work which is not in large measure a commentary on Keynes – that is the measure of his triumph." Robertson is probably better known for his further elaboration and defence of the loanable funds (borrowing and lending flows) approach to the determination of the interest rate, against Keynes's liquidity preference (supply and demand for money stock) theory. Robertson's (1938) "Survey" was an attempt to cut through the debates to find the substantive points in dispute. Like Hicks ([1939] 1946, chapter 12), Robertson (1938, pp. 14-15) saw the loanable funds vs. liquidity preference debate as a "shadow-fight", since they represented complementary views about short-run monetary influences on the rate of

[11] The back cover of Hicks's 1966 edition of Robertson's monetary essays stated that, after working in partnership with Keynes, Robertson later "became Keynes' most formidable critic".

interest. The "real issue" pertained to the relevance of "normal" positions of long run macroeconomic equilibrium, when, in Robertson's view, Wicksell's natural rate of interest, determined by the rate of return on capital ("productivity") and time preference ("thrift), becomes dominant.

Upon receiving a set of first proofs of the *General Theory*, Robertson pointed out in a letter of 3 February 1935 to Keynes that its "real *differentia*" was the abandonment of the analysis of "disequilibrium … in terms of fluctuations around a norm" and its replacement by the study of a "chronic failure to get up to a norm" (Keynes 1973a, p. 500). Robertson disapproved of that new perspective and its corollary that aggregate demand management should be able to determine the position of equilibrium itself, instead of stabilizing or damping fluctuations around it (see also Kohn 1986, pp. 1215-16 on the differences between Keynes's "monetary" and Robertson's "real" equilibria). As observed by Hicks (1982, pp. 129-30), Robertson continued after the *General Theory* to look at fluctuations of output, employment and prices as "*temporary* divergences from an 'equilibrium' … He still wanted to think of the problem of employment as a problem of fluctuations about an 'equilibrium' – which was not only to be such that in it activity was to be *normal*, but also such that prices were stable at a *normal* level". Indeed, Robertson ([1951] 1952, p. 97) described himself as a "classical" economist, using the word "classical" for an analysis conducted on the assumption that "the monetary system operates in such wise as to interpret and not to distort the influence of 'real' forces".

Robertson's ([1933] 1940; 1934) first discussion of "normality" in macroeconomics reflected debates involving Keynes, F. Hayek, G. Myrdal and others in the early 1930s about how to use Wicksell's concepts of the natural rate of interest and monetary equilibrium when income and employment, as well as prices, change over the business cycle. That differed from Wicksell's original main concern with nominal cumulative changes. As put by Robertson in a letter of 16 April 1936 to G. Haberler (in the Robertson Papers), he still found himself "clinging to the idea that 'normalcy' or 'equilibrium' as meaning something, provided that that something is different in a society which is the heir of past fluctuations" from what it would be in a stationary or steady state economy (the latter is discussed in Robertson's *Lectures*, part III, chapter 2). That was a main contribution of his 1934 diagrammatic analysis of saving and investment over the business cycle, which would prompt criticism from Keynes (1936) and counter-reactions from Robertson in the following years.

The concept of equilibrium associated with equality between saving and investment at the natural rate of interest over the business cycle "implies a state of affairs in which (1) wages and profits are at a 'normal' level, (2) capital is growing, but (3) since the society has already become a prey to fluctuations, employment of the factors of production is not full but at a level which is in some sense the mean between those attained in boom and in depression" (Robertson 1934, p. 651). He had warned in another article against the temptation to try to "define normality in terms of the fullness of employment of the factors of production", for '"the level of factor-employment attained at the moment of greatest activity is substantially above the average or the most frequent level" ([1933] 1940, p. 100). The "normal level" of wages and profits, along the lines of his 1915 analysis, would be defined in the *Lectures* (1963, p. 431) as "corresponding to the long-run expectations" of workers and entrepreneurs, when their price anticipations are correct.

In figure 4, initial equilibrium is illustrated by the intersection between the curves of demand for investment DD' (representing the declining marginal productivity of capital) and of supply of saving SS' per unit of time at the natural rate of interest PM (Robertson, 1934, p. 651). Such long period equilibrium is disturbed by a shift upwards of DD' to D_1D_1', caused by an exogenous increase in the marginal productivity of investment. If the banking system keeps the market rate of interest at its initial level MP, the rate of lending exceeds the flow of new savings to the extent MM_1, which consists of newly created bank money and some "dishoarding" (that is, a reduction of the Cambridge *K*). The demand side of the loanable funds market is formed not just by investment demand but also by money hoarding, while the supply side comprises saving, dishoarding and credit creation by banks. Given the "Robertsonian lag", real disposable income is reduced by ensuing rising prices, and consumption by the public is below its expected value, a process called "automatic lacking". Additional saving may be also "induced" through the rise in prices, as individuals will seek to restore the real value of their money balances by reducing consumption.

[Insert figure 4 around here; now at the end of the paper]

Robertson identified yet another form of forced saving, brought about by a reduction of real wages as prices in the current "day" exceed the level expected when money-wages were set the "day" before. While automatic and induced lacking take place during the process of rising prices, forced saving resulting from the "distortion of contracts occasioned by a rise in prices which has already occurred" continues even after inflation stops – that is, the saving curve shifts to the right due to a change in income distribution. The displacement of the savings curve SS' to S_1S_1' is also explained by the effects of the decline in real wages on labour demand and output, which will "progressively increase total incomes and redistribute them in favour of entrepreneurs" (1934, p. 652). Robertson (ibid; italics in the original) coined the phrase "*quasi-natural* rate" to describe the rate of interest P_2M_2 which would equilibrate investment and saving under the new conditions. Assuming that the actual rate of interest rises towards its quasi-natural level, the economy will settle at the level of savings (and investment) OM_2, with no further credit creation.

Robertson's "quasi-natural" interest rate, with its notion that the position of the saving curve depends on the income level, was an important conceptual innovation, which he credited to his exposure to the "prenatal activities" of the *General Theory* (Robertson 1936, p. 184, n. 4). However, unlike Keynes (1936), this "*quasi-equilibrium*" is temporary, since excess demand for labour at real wages lower than expected brings about an increase in money-wages in the next period, which raises real wages and shifts the saving curve back to its initial position. This process of real wage reversal – further elaborated by Champernowne (1936), with no reference to "forced saving" though – would play an important role in Robertson's (1938) attack on Keynes's (1936) notion of "full employment".

In the meantime, capital accumulation made possible by the forced saving process reduces the marginal productivity of capital goods (described as "saturation with *existing* instruments") and causes a displacement downwards of the curve of marginal productivity to D_2D_2'. The ensuing process of credit contraction and falling prices brings about automatic and induced "dislacking" (that is, an unanticipated increase in consumption, followed by a reduction in real money balances to their planned level), as well as an unanticipated increase in real wages involving "the shrinkage of income and its redistribution in favour of non-savers" (1934, p. 653). The saving curve shifts downwards to S_2S_2', which intersects D_2D_2' at the new quasi-natural rate P_4M_4. If the bank rate of interest is also reduced to P_4M_4, the new

position of quasi-equilibrium in the depression will feature a flow of savings and investment OM_4 and a rate of unemployment higher than its average value. This lasts longer than the quasi-equilibrium position in the boom. Due to the "greater resistance of wages against a fall than against a rise", S_2S_2' will not easily move back to SS', and the economy will "bump along the bottom" (ibid). The economy will only home in on its "normal" employment position if the eventual fall in money-wages prompts convergence of the rate of interest to its "natural" level.[12]

The asymmetry between quasi-equilibrium positions was behind Robertson's (1934, p. 654) suggestion that the central bank should reduce the rate of interest below its quasi-natural rate level P_4M_4 towards P_5M_5. P_5M_5 cannot be called a natural rate of interest, since it is unlikely that (given the position of D_2D_2') the expansion and redistribution of income promoted by a reduction of the bank interest rate will bring the saving curve right back to its normal position SS'. Nevertheless, a reduction of the bank rate will displace S_2S_2' rightwards to some extent and create conditions favourable to an eventual rise of D_2D_2' to DD' when a new wave of technological change comes along (*ibid.*). Robertson (p. 655) warned that "if, in a society which has already become a prey to fluctuation, full employment of the factors of production, in their existing distribution between consumption and construction trades, is taken as the objective of policy, there seems a virtual certainty that normality will be overstepped, and the ball of cyclical fluctuations set rolling again".

Keynes (1936, p. 327) described Robertson's 1934 argument – that "full employment is an impracticable ideal" and that the "best we can hope for" is an average between boom and slump – as "unnecessarily defeatist". Instead, Keynes (p. 322) claimed that the right policy was to maintain the rate of interest low enough so as to keep the economy "permanently in a quasi-boom" at the maximum possible employment level. Moreover, Keynes (p. 180) adapted Robertson's 1934 diagram – the only diagram in the *General Theory* – in order to reject the natural rate of interest concept. Keynes's charge of "defeatism" would be often (if sometimes indirectly)

[12] See Leijonhufvud (1981). Leijonhufvud has argued that Robertson's "quasi-equilibrium" in the downswing may be turned into a Keynesian unemployment equilibrium, since, with saving and investment equalized via income reduction, there will be no excess supply of loanable funds and, therefore, no pressure to bring the rate of interest to its "natural" level. However, this disregards the possibility that a fall in real wages may shift the saving curve and contribute to the adjustment of the economy to its natural interest rate.

mentioned and counter-attacked by Robertson ([1936] 1940, pp. 109-10; 1938, p. 19; 1950, p. 14; [1957-59] 1963, pp. 437-8). From Robertson's ([1957-59] 1963, pp. 437-8) perspective, the central issue was Keynes's (1936) "dramatization of the contrast between mass unemployment on the one hand and 'full employment' – a phrase I have always mistrusted – on the other", which "over-simplified the problem of objectives" of economic policy. The *General Theory* offered little guidance over that "broad and difficult tract which lies between extreme depression and hyperinflation" (Robertson 1950, p. 14). Robertson ([1936] 1940, p. 110) ascribed to Keynes the view that "not until unemployment is conquered can inflation in any damaging sense be said to begin" (cf. Keynes 1936, p. 289), that is, the notion of an inverse L shaped aggregate supply relation, which he found theoretically and empirically flawed.[13] Robertson (1938, p. 6) acknowledged that in the *General Theory* an increase in output leads to a rise in prices because of increasing marginal costs (at given money-wages), but that was a relation between output and the price level, not inflation rate.

The "real cleavage of opinion" (Robertson [1936] 1940, p. 110) was: at what point should monetary and fiscal expansionary policies be suspended? There was no disagreement between him and Keynes concerning the necessity to deploy monetary and (especially) fiscal policies to fight depressions. However, as the British economy left the Great Depression behind and enjoyed a mild boom around 1936-37, a political and theoretical context was created for Robertson's (1938) development of the concept of "normal" output. As interpreted by Robertson (1938, pp. 11-12, 16), Keynes's view – that the only acceptable "normal" was the level at which there is "virtually full employment of all human and material resources" – depended on the assumption that it is within the power of central banks to establish "without risk of reversal such a level and distribution of output" that the relation between the rate of interest and saving is satisfied "whatever rate of interest the authority chooses to prescribe".

Robertson accepted, against Hayek and L. Robbins, that capital formed during the boom was a permanent addition to wealth, but argued that Keynesian full employment policy entailed the "unreasonable enrichment of the entrepreneur class",

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[13] "We cannot draw a hard-and-fast line, as some have sought to do, between what happens when there are unemployed resources and what happens when there is something more or less arbitrarily defined as 'full employment'" (Robertson 1948, p. 205).

and that real-wage reversal prompted by workers' reaction to inflation would induce "crisis and collapse". By attempting to "abolish the residuum of unemployment today", demand expansion would make "it worse for tomorrow" (Robertson ([1936] 1940, p. 110; see also 1936, p. 186).[14] The size of Robertson's "normal" or "average" unemployment rate resulted from the imperfect mobility of labour between the production of consumption goods and capital goods, which oscillated cyclically. This is not far from the definition of the natural rate as the average rate of unemployment over a number of periods in an economy submitted to technological shocks, given by Blanchard and Fischer 1989, pp. 346-50. Interestingly, Friedman (1962, pp. 284-85) used the term "normal" unemployment as an average over the business cycle. Robertson did not refer to Keynes's (1936, p. 6) notion of "frictional" unemployment, which did not vary throughout the business cycle phases.

Keynes, nevertheless, reacted positively to both Robertson's 1936 Harvard and 1938 Manchester lectures, where the notion of "normal" output was developed as a criticism of the *General Theory*. In a latter of 6 December 1937 to Robertson, Keynes found his 1938 Survey "scrupulously fair", although it illustrated Robertson's "sentimental attachment to words which have once meant something to you". Keynes deemed the intellectual differences between them "very small indeed at bottom" (Keynes 1979, p. 165). In another letter, of 13 December 1936, Keynes (1973b, p. 89) – reacting to Robertson's 1936 Harvard paper and its "practical applications" – referred to a series of forthcoming articles in *The Times* on "How to avoid a slump", in which he went a "long way along the same route" as Robertson. Indeed, in those articles Keynes, instead of stressing expansion of aggregate demand (when the British rate of unemployment was around 9%), focused on changes in the sectorial and regional distribution of demand.[15] He agreed with the warnings given "quite rightly by Mr. D.H. Robertson" of the dangers of allowing economic activity to advance "too rapidly" along the increasing marginal cost curve "towards the goal of full employment" (Keynes 1939, p. 45). Keynes would regret, in correspondence with Pigou of 17 August 1938, his post-1936 debates with Robertson.

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[14] Cf. Friedman (1966, p. 59): "The true trade-off is between unemployment today and unemployment at a later date. It is not between unemployment and inflation".

[15] See Keynes ([1973] 1977). On the basis of those articles, Hutchison (1977, pp. 14-15, 44-47) has suggested that Keynes was closer to the natural rate of unemployment idea than is usually accepted.

> There is really no difference of opinion between myself and Dennis on the major points. We are on the same side of the fence as against past doctrine and as against many other economists, e.g., in America. But he seems to think it a duty to invent and to magnify differences (Moggridge 1992, pp. 601-02)

5. Cheap money, inflation and wages

Despite Keynes's attempted conciliation, there was at least one major disagreement, concerning interest rate policy in the boom. Keynes ([1937] 1977, p. 68) worried that an increase of the rate of interest in the upswing would precipitate a slump. "We must avoid [dear money], therefore, as we would hell-fire". That was consistent with Keynes's (1936, p. 322) advice, mentioned above, that monetary policy should keep the economy in a permanent "quasi-boom" through cheap money policy (see also Wilson 1980, p. 1536). Soon after Keynes's articles in *The Times*, Keynes (1937) reaffirmed his view of interest rate policy in a letter to *The Economist*, followed by Robertson's (1937) reaction. The letters were published under the general title "Bankers, boom and budget". Robertson (1940, pp. 23-24) soon provided a summing up of the arguments of the 1937 *Economist* debate. He criticized Keynes's (1937) contention that a rise of the interest rate should be always avoided whenever there was an increase in liquidity preference, regardless of whether it was due to an increase in trade activity or a fall in confidence (Robertson 1937). According to Robertson ([1951] 1952, p. 106; [1957-59] 1963, p. 380), Keynes's 1937 argument revealed the "canker in the heart of the Keynesian theory of interest" – a canker that led to the cheap money policy adopted in the UK and in the US in the post-war period.[16] Cheap money policy reflected also what Robertson perceived as Keynes's stagnationism, which dominated American Keynesianism through Alvin Hansen's influence. Although Robertson and Keynes shared a view of depressions as caused by downward shifts in investment demand accompanied by excess demand for money

[16] Robertson's other (better-known) objection to Keynes's interest theory was that it was about divergences between the actual and expected "normal" rates, without any explanation of what determines the normal rate. Moreover, Keynes inaccurately expressed speculative demand for money in nominal, not real, terms. In the long run, the liquidity preference schedule determined the price level, not the rate of interest, claimed Robertson (1938, p. 18).

("abortive saving"), they parted company on whether depressions were a sort of endemic "worm" on the way to stagnation or a "cyclical snake" characteristic of economic fluctuations around a norm, as discussed in Robertson ([1936] 1940).

From Robertson's ([1955] 1956, p. 126) perspective, cheap money was an essential ingredient of the post-war "full employment pledge", made possible by a change in the monetary regime. The "flaccidity of monetary systems" in that period, in contrast with the gold standard, created conditions to implement the public demand for "full employment" policies (Robertson op. cit., p. 119). Unlike Champernowne's (1936) Wicksellian approach, Robertson had not discussed inflation (or deflation) acceleration as part of the homing in mechanism, since he had assumed relatively inelastic money supply in Marshallian fashion. Moreover, in the inter-war period he had dealt primarily with *cyclical* price level changes around a norm. In the 1930s and before, rises in money-wages in the upswing were welcome because they could, working in conjunction with a firm monetary policy, prevent an approach to "absolutely full employment" (Robertson [1949] 1952, p. 92). But in the new post-war paper money monetary regime,

> [I]t becomes necessary to regard such rises in money wage-rates with apprehension, not because they carry a threat of unemployment, but precisely because they do not, or rather because the unemployment of which they carry a threat is not the relatively mild type usually associated with a trade recession, but the much more frightening type associated with a breakdown of the standard of value (ibid).

Robertson ([1955] 1956, p. 120) disputed the view, put forward at the time by Harvard economist Sumner H. Slichter (1952), that a policy of slow rate of inflation was better than preventing money-wage claims by means of an increase of the unemployment rate (see Hutchison, 1968, chapter 3, and Nelson 2009 for the context of Robertson's 1949 and 1955 articles). Such a creeping steady inflation – seen as a by-product of the central bank decision to supply whatever flow of money is needed to "discharge whatever *wage-bill* is needed to reconcile full employment with whatever *wage-rate* is demanded by the Trade Unions" (Robertson [1949] 1952, p. 91) – was bound to turn into galloping accelerating inflation as economic agents reacted by introducing sliding-scales into monetary contracts.

That differed from Champernowne's (1936) acceleration, since it was caused not by adaptive expectations, but by an anticipation of the effects of the announced "full employment" policy. As the "victims" are rescued through indexed contracts, until "there is nobody left to cheat", the alleged advantages of creeping inflation "in stimulating business enterprise will also be whittled away". Moreover, the beneficiaries of inflation will endeavour to preserve their threatened leads, so that the planned orderly price rise will turn into a "land-slide, generating not a condition of 'full employment' but a hectic and disorderly muddle, which could only be checked, at the cost of much disemployment and distress, by the re-establishment of drastic monetary discipline" (Robertson [1955] 1956, pp. 123-24). In principle, one could conceive of demand management tuned to the absorption of aggregate supply at a "reasonably full" employment level – that is, Robertson's (1938) "normal" output, although he did not use the word – but that was a difficult exercise. The effort of avoiding unemployment meant that most deviations or mistakes would be on "the side of making the stream of monetary demand excessive" (p. 118). The upshot, Robertson (p. 128) hesitantly concluded, was that the "sacred cow" of "full" employment, even if reasonably conceived, should not be the utmost aim of policy.

When Robertson, as the only economist member of the 1957-58 British "Council on Prices, Productivity & Incomes", known as the "Cohen Council" (named after Lord Cohen, its Chairman), drafted its "First Report", he prescribed the stability of the price level as the primary objective of monetary policy, while reproducing his 1955 argument about inflation acceleration (Council 1958, chapter IV; see also Hutchison [1968] 1992, pp. 137-50 on the controversies surrounding the Report). Measures to bring down the inflation rate would entail a higher recorded rate of unemployment, as it happened after the significant increase of the bank rate of interest in September 1957, endorsed by Robertson in chapter V of the Report. According to the Report (pr. 136), British inflation resulted from excess aggregate demand associated to a rate of unemployment lower than the "margin of unemployment" necessary to give "reasonable industrial flexibility" to the labour market. The crucial issue was the extent of extra unemployment needed in order to damp down trade unions' claims for wage increase. Against the then prevailing opinion, Robertson hold the "optimistic view" that the increase of unemployment beyond its equilibrium level would be mild (if any), provided trade unions found the change in monetary policy credible and, therefore, refrained from further wage claims (par. 137).

In a 1959 address about his participation in the Cohen Council, Robertson ([1959] 1992, p. 112) referred to that paragraph as the "central passage" of the Report, and claimed that he had been vindicated by facts. The Report expected that the "firm action" of September 1957 "*would* be found to work its way through into the wage contract, and that … it would *not* require enormous realised percentages of unemployment, but only a definite change of atmosphere, to take a great deal of stem out of the wage push" (ibid; see also Robertson [1957-59] 1963, p. 451; 1961, p. 37; 1963, p. 23 for similar passages).[17] Moreover, the events of 1957-58 showed that there is a "clear link" between monetary policy and money-wages ([1957-59] 1963, p. 451) through the effects of expected money supply on wage claims, as Robertson ([1949] 1952) claimed. While discussing the Cambridge quantity theory of money, Robertson (1922, pp. 36-37) had argued that, like other goods, the value of money was influenced by "people's estimates of the quantity likely to be called into existence in the near future".

Phillips's (1958) article came out shortly after the Cohen Council First Report. Robertson ([1959] 1992, pp. 111-12; partly reproduced in Hague 1962, p. 456) discussed Phillips's results in connection with the Report's analysis of the causes of British inflation. Robertson – the external examiner of Phillips LSE PhD thesis – had, orally and in correspondence, criticized in 1950 the absence of equations of price dynamics in the Keynesian models presented by Phillips in his thesis and in the "Phillips Machine", which led Phillips to embark on the theoretical and empirical research that led to the Phillips curve (Blyth 1975, p. 306). Phillips (1958, pp. 283-84) assumed that the rate of change of the cost of living was not a factor in the determination of money-wages, except at times of rapid rise of import prices (as could happen in the UK) or of home-produced agricultural products. The price of domestic industrial products, he argued, was determined by a mark-up on wage costs (for a given average productivity). Hence, as long as real wages were either rising or constant in an open economy, changes in money wages were determined by the rate

[17] David Worswick (1958, pp. 252-53) maintained in a memorandum prepared for the Cohen Council that "while trade union leaders might be deterred from wage demands if unemployment were 10 or 15 per cent … they would hardly be deterred by a mere 2 or 3 per cent unemployed". Harry Johnson (1956, pp. 19-20) made similar claims. Unemployment rates oscillated around 2% during the 1957-59 stabilization experiment.

of unemployment only, as a proxy for excess demand for labour (see also Phillips 1962, p. 11; Wulwick 1989, p. 183).

Robertson ([1959] 1992, p. 111; 1961, p. 35) agreed with Phillips's argument that the introduction of cost of living adjustments in money wage determination was (apart from cost inflation represented by big shocks to import prices) redundant and inoperative, since a wage advance would occur anyway for purely competitive reasons.[18] He welcomed Phillips's results, as they supported the "optimistic" view that a rate of unemployment around 2.5% was enough to preserve price stability, as well as the interpretation of British inflation as excess demand. He was sceptical, however, about Phillips's main contention that there was a "fixed psychological function relating the attitude of trade unions to the level of employment over a whole century", as expressed by the stability of the curve (Hague 1962, p. 456). In particular, Robertson ([1959] 1992, p. 112) claimed that Phillips's econometrics did not affect the Cohen Council's point about the importance of a change in "atmosphere" (that is, perception of monetary policy) in bringing about a reduction of money-wages claims without significant increase in unemployment.

Champernowne's (1959) position about the relevance of price changes in the determination of money wages differed from Phillips's and Robertson's. He reacted negatively to the econometric result of Dicks-Mireaux and Dow (1959) that each percentage increase in the cost of living would increase money wages, with a lag, by about a half of that. Champernowne acknowledged the problem involved in the correlation between prices and money wages due to the effect of wages on prices, but found the estimated value of the short-term elasticity of price movement to wage movement "too low". Consistently with his 1936 article, Champernowne (1959, p. 175) claimed that there was a "larger long-term elasticity which is of great practical importance". After a few periods, as workers become better informed, the increase in money-wages will reflect the inflation rate. "In my opinion, the long-term elasticity of wages to prices should be nearer unity than one-half" (ibid). In order to test his hypothesis, Champernowne related wage increases to the centred lagged three-year moving average of price-increases; he found a long-term elasticity of 0.82, much

[18] Cf. Santomero and Seater (1978, pp. 509-10) for a similar argument. They argued that only *anticipated* price changes may be included as a variable in addition to excess labour demand. Robertson implicitly took that into account when referring to the influence of anticipated monetary policy on wage claims.

closer to one than the value estimated by Dicks-Mireaux and Dow. This suggested, according to Champernowne (ibid), that "by properly allowing for the delayed effects of price-increases on wages … one would get a figure of nearly one, suggesting that extra price-increases *eventually* result in almost as much as extra wage-increases". That was an isolated attempt to implement statistically his 1936 incipient notion of workers' adaptive expectations.

The Cohen Council's plea for price stability as the overall monetary policy goal was soon challenged by Nicholas Kaldor ([1958] 1989, p. 459, n.), who – in support of his own argument about the positive effects of rising prices on profits and growth – referred to Robertson's (1922, pp. 122-25; 1948, pp. 138-40) section on "The case for a gently rising price level" as contradictory with the Council's First Report. Indeed, Robertson (1948, p. 138) had stated that a "*continuing* fall [in the value of money] by encouraging expectations" of entrepreneurs' gains, "stimulated then to an increased production". The case for price stability is based on the notion that it ensures absence of forced saving in monetary equilibrium.[19] Robertson ([1928] 1940, p. 57), however, entertained what he described as his "own private heresy" – that is, the view that "a little forced saving now and then may be the necessary price which we have to pay for what we call progress", in order to take advantage of discontinuous leaps in investment and technology at the cost of higher cyclical instability.

The conflicting claims of "progress" and "stability" always attracted Robertson's attention, from the final pages of his 1915 *Study* (pp. 253-54) to his 1958 address to the International Economic Association (Robertson 1958). He charged Keynes (1936) for ignoring the trade-off between macroeconomic stability and economic growth. The *General Theory* stayed away from the "difficult art of getting the best of both worlds, the world of progress and the world of stability" (Robertson 1936, p. 187). Neither was the trade-off recognized by Austrian business cycle theory (Robertson [1935] 1940, p. 172). The "stimulus of rising prices" is "partly founded in illusion" and therefore temporary, but effective while it lasts.

> The salaried official and the trade unionist have been beguiled into accepting employment for a lower real reward than they intended. Even the business

[19] Robertson (1948, pp. 134-38) maintained that, in an economy with steady increase of productivity, monetary equilibrium would be associated to falling, not stable, prices.

> leader is the victim of illusion, for he is spurred on not only by real gains, but also by imaginary gains at the expense of his fellow businessmen. It is so hard at first to believe that other people will really have the effrontery or the good fortune to raise their charges as much as he has raised his own. But whether real or illusory, the spur is effective. (Robertson 1922, p. 124; 1948, p. 139)

This followed along the lines of Robertson's 1915 analysis discussed above. A disequilibrium path leading eventually to equilibrium may be preferable to remain indefinitely at a particular monetary equilibrium, even if it makes no permanent difference for the rate of unemployment (the capital stock will be permanently affected, though). That differed from Slichter's (1952) position Robertson criticized. Moreover, the saving ratio under monetary equilibrium may be lower than the value that provides an optimal growth rate à la Ramsey (Robertson [1957-59 1963, pp. 360-61; 1958, pp. 8-9). It is implicit in Robertson's argument the notion that there is an optimal inflation rate that depends on time preference, as suggested by his warning about the risks of "pressing too far a policy of forced levying" to speed up capital accumulation ([1957-59] 1963, p. 361), and in his remark that, in view of the greater danger of inflation acceleration, "I should now have to desire a given rate of capital growth very strongly … to be willing to see it consummated with the aid of inflation" (Robertson (1958, pp. 13-14). In the end he settled for price stability as the "wiser path", at least in the case of capital intensive "rich countries" such as the UK.

6. Anticipations and influences

Despite some striking similarities, Friedman (1966, 1968, 1975, 1977) did not refer to Champernowne or Robertson in his writings about the natural rate hypothesis. In that connection, Phelps's (1969, p. 157, n. 31; 1972, p. xii) only reference was to Robertson's *Money* section about "gently rising prices", with a quotation from the paragraph about monetary misperception. Indeed, Phelps's (1967) discussion of the optimal employment-inflation path (Howitt 2007; Rivot 2018) clarified some issues that had remained unsettled in the Robertson-Kaldor exchange about the effects of rising prices on the level and growth of output (cf. Robertson 1961, pp. 25-26).

Phelps's relative familiarity with Robertson may be ascribed to Fellner's lectures at Yale in the 1950s (cf. Fellner 1952).

Friedman, of course, was an attentive reader of Robertson. One of his first papers was based on Robertson's ([1926] 1949; 1933) concept of money hoarding (Friedman and Abramovitz 1934). Friedman, however, found Robertson's *Banking Policy* a difficult and "impenetrable" book, as he told Roger Garrison in conversation in the early 1990s (Garrison 2016, p. 715), which may help to explain why he did not come back to Robertson's dynamic method. Robertson's ([1926] 1949) complex argument and idiosyncratic terminology had posed difficulties to many, not least Keynes himself (Presley 1979). Robertson's *Money* and his 1955 "Creeping inflation" article made it for easier reading. In 1957 Friedman and C.W. Guillebaud took over the editorship of the Cambridge Economic Handbooks, which included *Money*, reprinted that year by Chicago University Press. Friedman's ([1958] 1969, pp. 182-83) point – that a designed policy of creeping inflation would lead to the introduction of "escalator clauses" and ensuing inflation "acceleration" – was reminiscent of Robertson ([1955] 1956).

Friedman ([1963] 1969, pp. 35-35) further elaborated his distinction between the effects on capital accumulation and "economic development" of a deliberate inflationary policy as opposed to undesigned increase in money supply and prices (such as gold and silver discoveries in the 15th and 16th centuries). In his 1967 Presidential Address, Friedman (1968) shifted the focus to the impact of inflation on labour supply and demand and, by that, on employment and output. Instead of his previous distinction between "deliberate" and "undesigned" price changes, Friedman assumed that workers learn through their experience of inflation (adaptive expectations), whereas firms hold perfect foresight about future prices. Workers temporarily mistake changes in nominal wages for changes in real wages, and increase their labour supply accordingly. As inflation information gradually comes in, they adjust their inflation expectations accordingly, so that a higher rate of growth of money supply and inflation is necessary in order to keep the rate of unemployment below its initial equilibrium ("natural") position. This is very close to Champernowne's (1936) argument.[20]

[20] In Friedman's 1968 formulation, the reduction of the unemployment rate below its natural level is caused by an increase of labour supply – as Phelps and other have pointed out, that is not really a model of unemployment, but of changes in labour's

Friedman (1975, pp. 21-21; 1977, pp. 456-57), in latter presentations of the natural rate hypothesis, dropped his 1968 asymmetry assumption and postulated instead that both employees and employers misperceive changes in money-wages and the price level as changes in real wages and relative prices. Moreover, he assumed that eventually "perceptions will adjust to reality" as agents realize that prices in general are rising and the economy returns to its natural rate path. This is the same as Robertson's ([1915] 1948) concept of the "illusory" effects of price changes discussed in section 3 above. It probably reflected as well Lucas's (1972) development of the surprise supply function under rational expectations, even though Friedman (1975, 1977) left open the precise expectations mechanism.

Nevertheless, Friedman differed from Champernowne and (the post 1934) Robertson in the specification of the homing in mechanism. Champernowne (1936) made clear the role of inflation (deflation) acceleration in compelling central banks to interrupt the inflation (deflation) process through interest rate adjustment. Some commentators (e.g. Phelps 1990, p. 33; De Vroey 2016, p. 105) have read Friedman (1968) along those lines, but there is no textual evidence to support that interpretation.[21] Instead, Friedman assumed that the condition that expectations are correct in the long run is sufficient to assure that unemployment approaches its natural level as agents become better informed, irrespective of the monetary policy of the central bank (see e.g. Nordhaus 1970, p. 10. n.1). As put by Mankiw and Reis (2018, p. 84), Friedman postulated that "regardless of what the central bank did, unemployment would over time approach its natural rate". Indeed, Friedman (1968) mentioned Wicksell in order to make an analogy between the problems involved in targeting the rate of interest and the rate of unemployment. Both cases would involve inflation acceleration and instability.[22] Apart from that, Wicksell's natural rate of interest played no substantive role in Friedman's critique of the Phillips curve (cf. however Cottrell's 1989 restatement of Wicksell's cumulative process with an aggregate supply function à la Friedman).

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participation ratio. In my 2005 article, I interpreted Champernowne (1936) along those lines, but I now believe the interpretation provided in section 2 above is closer to his meaning.

[21] Actually, the notion that the central bank would be forced to stop disequilibrium hyper-inflation or hyper-deflation was mentioned by Phelps (1968, pp. 682-83), not by Friedman.

[22] Friedman's assertion, that Wicksell did not consider the Fisher effect – and, by implication, disregarded inflation acceleration – is wrong (see Boianovsky 2013).

Friedman was aware of Keynes's (1936) contention, endorsed by Champernowne (1936), that, for a given level of aggregate demand and interest rate, changes in money-wages will not affect real wages. Keynes's unemployment analysis was based on the argument that the real wage rate consistent with saving-investment equality at the current interest rate

> [M]ight be different from the real wage rate consistent with "full" employment … In such a case, Keynes argued, a decline in "real" wage rates would add to employment, but such a decline could not be achieved by a decline in "money" or "nominal" wage rates, since such a decline would be matched by an exactly parallel decline in "money" or "nominal" prices. (Friedman 1976, p. 214; see also Friedman 1997, p. 12)

The matter was associated to the liquidity trap or, more likely, to the zero lower bound on the interest rate. Friedman ignored such inter-temporal coordination problems in his statements of the natural rate hypothesis presumably because he applied it primarily to inflationary conditions. In the same vein, Phelps (1990, p. 22) identified the *General Theory* with the study of permanent depressions under conditions of a negative Wicksellian natural rate of interest.[23] The response to Keynes's challenge to classical economics, claimed Friedman (1976, 1997), was provided by the real balance effect. Indeed, Friedman's (1968, pp. 2-3) reference to the Pigou effect at the outset of his address apparently intended to exclude saving-investment issues from the discussion of the natural rate hypothesis.

Was Friedman aware of Champernowne (1936)? They were exact contemporaries, born on the same year (1912). Friedman (1936) had a note published in the same volume of the *Review of Economic Studies*, the journal of the young mathematical economists. The topic of Friedman's note was the elasticity of substitution, discussed at length by Champernowne (1935). Their second "encounter" took place in 1953, when both contributed seminal papers on the stochastic approach to income distribution (Champernowne 1953; Friedman 1953). Champernowne (1936) was reproduced in the well-known Lekachman (1964) collection, which also

[23] When asked about what was the central message of Keynes (1936), Phelps replied that it was the claim that the operation of the economy at its normal equilibrium "may be impossible because you may need negative money rates of interest". Keynes's framework is very controversial, but "that hard core proposition has survived" (interview to Snowdon et al 1995, p. 343).

included a new essay by Champernowne, about expectations in Keynes. Friedman's exposure to the 1964 reprint of Champernowne's 1936 article would help solving the puzzle of how the American economist evolved from his 1958 and 1963 remarks about inflation and growth to his 1966 and 1968 formulations of the formation of inflation expectations in the labour market (cf. Forder 2010, p. 495).

If Friedman really read and absorbed Champernowne (1936), he was one of the very few. The paper did not command much attention, and its links with the natural rate hypothesis went unnoticed until recently (Darity and Young 1995; Boianovsky 2005). In part because of their rejection of the IS-LM family of models – despite the fact that IS-LM could be found in Keynes's lectures and in the *General Theory* (see Harcourt 2002) – Cambridge economists did not endorse Champernowne's approach. Keynes never reacted to Champernowne in correspondence or in print, but his rejection of the view – that rises of aggregate demand produce "their effect by deceiving, so to speak, the working class into accepting a lower real wage … covertly effected by the rise in prices ensued on the increase in effective demand" (Keynes 1939, p. 40) – was possibly aimed at Champernowne. Sure enough, Champernowne (1936, pp. 211-14) stressed how the effects of uncertainty on investment and liquidity preference might prevent the working of the homing in mechanism in the depression, but that was not enough to warrant sympathy from the Keynesian camp. Robertson never referred to Champernowne's "basic" unemployment, akin to Robertson's own "normal". It did not help matters that, except for his 1959 comments, Champernowne never returned to the issues raised in 1936. His 1958 Cambridge growth model assumed away "monetary effects arising from the fixing of contracts and wages in terms of money rather than in consumption goods" (Champernowne 1958, p. 211). His 1936 labour market model is not mentioned in his 1964 essay and in his 1968 book either (see also Boianovsky 2019).

Likewise, Robertson did not refer to his 1938 notion of "normal" output in the post-war debates. Furthermore, he never gave up his early view that there was an element of market failure in the business cycle, which was behind his support of contra-cyclical fiscal policy (Laidler 1995; Robertson 1963, p. 17). That, of course, did not fit into the Phelps-Friedman natural rate hypothesis. Neither did Champernowne's and, especially, Robertson's overall focus on inter-temporal coordination problems. Friedman got it right when he stated that:

> I may say that by comparison with my own extremely libertarian position, Robertson seemed to me nearly as much an interventionist as did Keynes. Robertson clearly had a great belief in individualism, but so did Keynes. And when it came to economic intervention … Robertson had a good deal of tolerance for it. (Friedman's letter to John Presley, 30 November 1972; Presley 1979, p. 239)

Champernowne did not react to the enunciation of the natural rate hypothesis by Friedman and Phelps in the 1960s. Joan Robinson's (1971, pp. 75-76; 85-88) reaction to Friedman (1968) was representative of how Cambridge economists perceived the central message of that address. Robinson did not refer to Friedman's argument about inflation acceleration, but only to his case for monetary rules defined in terms of a rate of growth of money supply. That was hardly surprising, as Robinson (1937), together with Champernowne, had discussed inflation acceleration in the 1930s (see Boianovsky 2005).[24]

As far as the natural rate hypothesis is concerned, Phelps (2007, p. 549) has criticized the widespread notion that his and Friedman's papers published around 1966-68 were a case of multiple discoveries of the same thing. They represented "discovery of two distinct phenomena", he insisted, since Friedman dealt with the rate of labour force participation, not unemployment as Phelps did. This is yet another instance of the controversial nature of Robert Merton's (1968) claim that multiple discovery is the dominant pattern in science. Nevertheless, using Merton's (p. 13) definition of "anticipations" as earlier formulations that "overlap the later ones but do not focus upon and draw the same set of implications", we may conclude that Robertson and Champernowne *anticipated* relevant aspects of the natural rate hypothesis. Indeed, the notion, in modern macroeconomics, of the natural rate of interest as the rate required to keep aggregate demand equal to the natural rate of output (Woodford 2003, p. 248), matches closely Robertson's 1930s framework. After all, as put by Robertson (1954, p. 189) in an oft-cited passage, "highbrow

[24] See also Niehans (1990, pp. 498-505) and Forder (2018) for the argument that the central message of Friedman (1968) was to propose monetary rules instead of discretion. As expected, Robertson (1951) defended discretion against rules à la Chicago.

opinion is like a hunted hare; if you stay stand in the same place, or nearly the same place, it can be relied upon to come round to you in circle".

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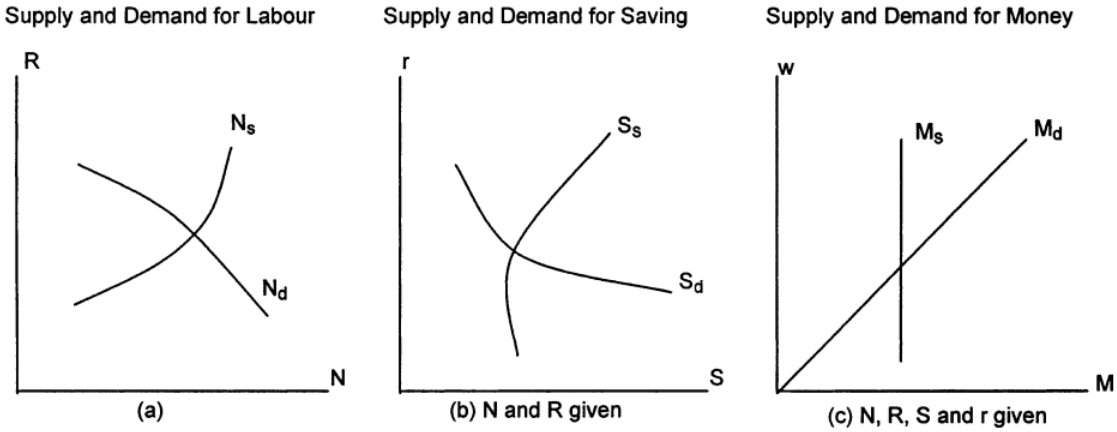

Fig. 1. *Classical scheme.*
Source: Champernowne (1936, p. 212).

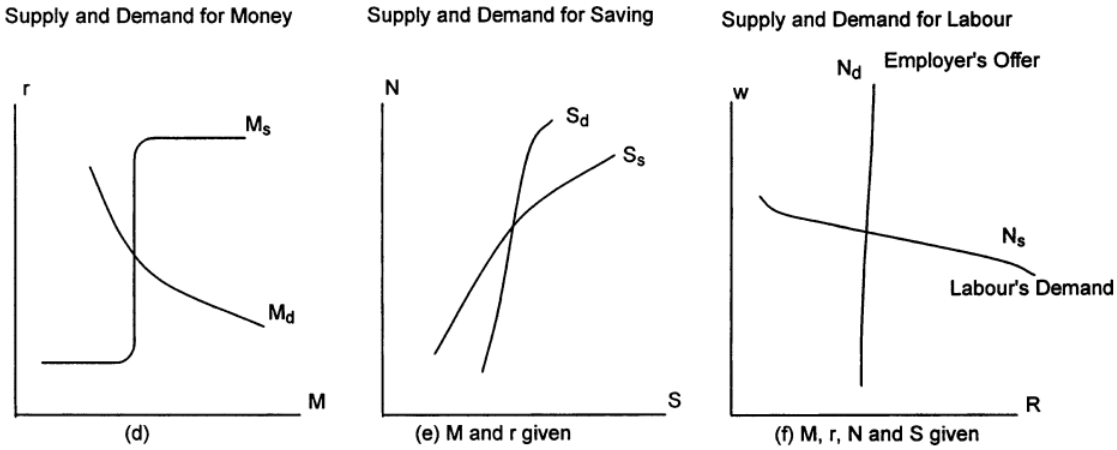

Fig. 2. *Keynesian scheme.*
Source: Champernowne (1936, p. 213).

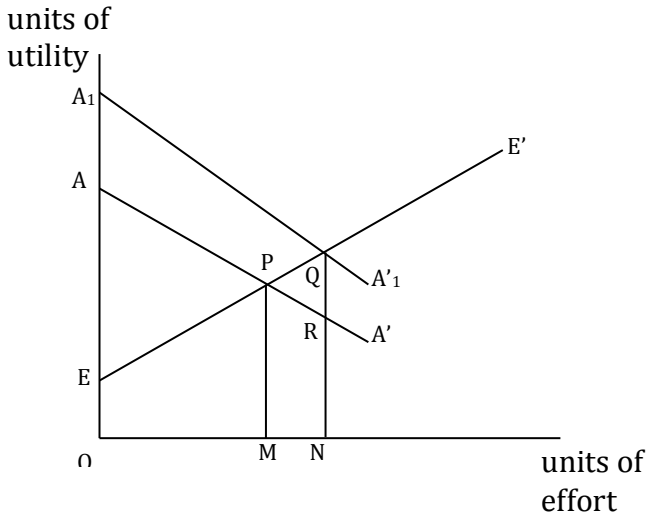

Fig. 3. *Money Illusion in the Boom*
Source: Robertson ([1915] 1948, p. 212)

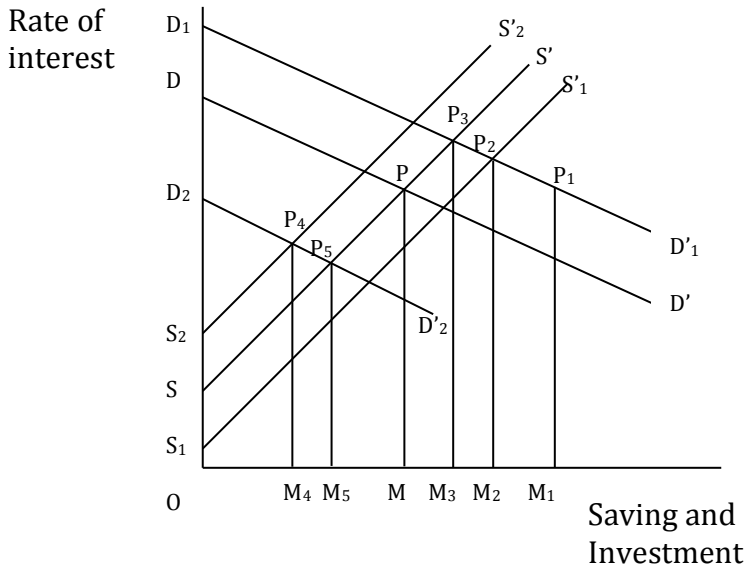

Fig. 4. *Business cycle and the natural rate of interest*
Source: Robertson (1934, p. 652)