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INTEREST AS AN ARTEFACT OF SELF-VALIDATING CENTRAL BANK BELIEFS

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ABSTRACT

The classical/Sraffian approach to distribution is proposed as a more congenial framework for Keynes's concept of interest as a conventional variable—resulting from the interplay between central bank behaviour and financial market sentiment—because it provides a sounder basis for multiple interest rate equilibria. While either monetary policy or market expectations can be decisive, the capacity of policy to ensure markets acquiesce in the authorities' view remains at least as plausible as Keynes supposed. Interest is a result of 'history' plus the beliefs of the monetary authorities, where those beliefs may be illusory but nevertheless validated by actual outcomes.

1. INTRODUCTION

The idea of a 'natural' rate of interest has deep roots in economic theory. The historical disjuncture between classical and marginalist economics shifted much of the ground of economic theory, but not all of it. Ricardo and Wicksell have radically different theories of profits on capital; but in so far as both had the 'equilibrium' general rate of profit determined by 'real' forces, certain common sorts of inferences inevitably followed from their different frameworks. For the purposes here, the most significant of these common inferences is that rates of return in money and other financial markets ultimately must be regulated by those real forces. A close observer, untutored in economic theory, might look upon financial markets and conclude that securities prices (and hence yields) are determined by the interaction of market supplies of, and demands for, those securities. Ricardo or Wicksell would not disagree; but they would be inclined to add that what untutored common

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sense thereby had failed to grasp was that demands and supplies in those markets themselves ultimately would be regulated by deeper underlying forces. Both would take the view that under conditions of free competition, comparisons between financial yields and the independent equilibrium rate of return on capital in production would play a decisive role in regulating the financial asset demands and supplies which are the proximate causes of securities prices. The independent rate of return could then be said to act as a kind of 'anchor' or 'centre of gravity' for financial yields. In this sense one could say, in the language of a traditional conceptual universe, that yields on interest-bearing and other financial instruments have 'natural' moorings. In short, there is a natural rate of profit or interest.

Appeals to nature are now not necessary, and probably not congenial, to the dominant modes of economic analysis; but the same essential idea concerning interest persists.[1] This long tradition in orthodox monetary thought was at least shaken by Keynes's attempted revolution. Apart from the Principle of Effective Demand itself, the most radical descriptive proposition in the *General Theory* was the positing of a 'monetary' theory of the rate of interest. At least, this is how the Keynesian intention for interest determination came to be described. It might better have been called a *conventional* theory of interest (except for the ambiguity, in this context, of that English adjective): a notion of the level of interest as *contingent*, rather than being reduced to a unique value by the requirements of equilibrium. Stripped to its essentials, the notion of interest as conventional amounts to this: the functional requirements for equilibrium of a competitive economy are consistent with a spectrum of possible values for the general profit rate. Hence the particular magnitude of the interest rate which emerges as an element of the equilibrium outcome is to that extent arbitrary. To employ an analogy, it is *functional*, or necessary, that we all drive on each side of the road in the same direction—whether on the left or right, is *conventional*. If there were only a unique value of the rate of interest consistent with equilibrium, then this underlying rate of return on capital would indeed be 'functional' for a competitive capitalist economy. It would be *necessary*. Furthermore, if

[1] The most recent incarnation is the 'neutral' rate of interest (Blinder, 1998, pp. 31–35), although Blinder evidently did not coin the term. It is just the real rate of interest that, via the IS schedule, generates the level of product market activity that equates actual unemployment with the natural rate or the non-accelerating inflation rate of unemployment (NAIRU). He notes that '[T]he basic idea, of course, dates back to Wicksell . . .' (Blinder, 1998, p. 79, note 6). It is a strange coincidence that 'natural' and 'neutral' sound so alike, although they do not share a common etymological root. As a matter of fact, Keynes (1936, pp. 242–244) once uses '*neutral* rate' himself (original emphasis)—as a synonym for his notion of a full employment rate of interest, asserting also its use by other of his contemporaries (Keynes, 1936, p. 183).

arbitrariness of the equilibrium rate of interest is a notion that can be sustained, then it would follow that, to the extent that their understanding conforms with monetary orthodoxy, the monetary authorities' self-understanding of what it is that they are doing is partly an illusion—and possibly a self-validating one. For if central banks (CBs) hold false beliefs about the world in which they operate, one might expect those beliefs to be eliminated by collision with reality—unless they are, in a certain sense, validated by experience. The analysis that follows shows conditions under which false CB beliefs about the world can be validated by actual outcomes.

Keynes's key statement of his conception of the conventionality of interest is worth quoting at some length:

> It is evident . . . that the rate of interest is a highly psychological phenomenon. . . . [T]he long-term market-rate of interest will depend, not only on the current policy of the monetary authority, but also on market expectations concerning its future policy. . . . Thus a monetary policy which strikes public opinion as being experimental in character or easily liable to change may fail in its objective . . . The same policy, on the other hand, may prove easily successful if it appeals to public opinion as being reasonable and practicable and in the public interest, rooted in strong conviction, and promoted by an authority unlikely to be superseded. . . . It might be more accurate, perhaps, to say that the rate of interest is a highly conventional, rather than a highly psychological, phenomenon. For its actual value is largely governed by the prevailing view as to what its value is expected to be. *Any* level of interest which is accepted with sufficient conviction as *likely* to be durable *will* be durable . . . [I]t may fluctuate for decades about a level which is chronically too high for full employment;—particularly if it is the prevailing opinion that the rate of interest is . . . rooted in objective conditions much stronger than convention . . . Such comfort as we can fairly take from more encouraging reflections must be drawn from the hope that, precisely because the convention is not rooted in secure knowledge, it will not be always unduly resistant to a modest measure of persistence and consistency of purpose by the monetary authority. Public opinion can be fairly rapidly accustomed to a modest fall in the rate of interest and the conventional expectation of the future may be modified accordingly; thus preparing the way for a further movement—up to a point. (Keynes, 1936, pp. 202–204)

A further important statement, which captures very clearly an element of the logical connection between the Principle of Effective Demand and the idea of interest as conventional, appears after the *General Theory*, in one of Keynes's responses to the reviews:

> . . . [T]he initial novelty [of the book] lies in my maintaining that it is not the rate of interest, but the level of incomes which ensures equality between saving and

> investment. The arguments which lead up to this initial conclusion are independent of my subsequent theory of the rate of interest, and in fact I reached it before I had reached the latter theory. But the result of it was to leave the rate of interest in the air. If the rate of interest is not determined by saving and investment . . . , how is it determined? . . . I hit on what I now think to be the true explanation. The resulting theory, whether right or wrong, is exceedingly simple—namely, that the rate of interest on a loan of given quality and maturity has to be established at the level which, in the opinion of those who have the opportunity of choice—i.e. of wealth-holders—equalises the attractions of holding idle cash and of holding the loan. It would be true to say that this by itself does not carry us very far. But it gives us firm and intelligible ground from which to proceed. (Keynes, 1937, pp. 212–213)

The purpose of what follows is to provide an approach to interest determination which enables Keynes's core intention with respect to the conventionality of interest, as expressed in the quotation above from the *General Theory*, to be rendered more coherent in execution, for contemporary circumstances. Keynes's theoretical execution of it failed to live up to his intention in important respects. Section 2 outlines a model illustrative of the notion of a spectrum of interest rate values, consistent with the equilibrium of a competitive economy. The third section provides an interpretation of how the convention is formed under typical contemporary monetary policy conduct. That is to say, it seeks to show how a particular rate from among those in the feasible spectrum may emerge. It also demonstrates how *false* CB beliefs about the world can be validated by actual outcomes. Section 4 considers how market opinion might overrule CB policy—a possibility entertained by Keynes. A brief conclusion follows.

2. MULTIPLE INTEREST RATE EQUILIBRIA

The idea of multiple equilibrium interest rates could have more than one theoretical foundation. The broad framework preferred here is consideration of competitive equilibria: 'long-period' analysis in the sense that homogeneous inputs, outputs and assets have uniform returns, prices and yields in equilibrium. Free competition—understood as individual pursuit of the highest returns, with free and unrestricted entry to and exit from markets—is presumed to ensure this outcome (under stable parameters). Here we show that multiple monetary equilibria are consistent with a classical treatment of distribution combined with a Keynesian treatment of quantities. The modelling—drawing upon Cesaratto *et al.* (2003, pp. 42–44) and Panico (1993, pp. 104–113)—retains the essential elements of Keynes's theory: long-

period output is demand determined; consistent with investment/saving equilibrium, the rate of interest is open to a spectrum of possible equilibrium values; interest is determinable independent of the rate of profit in production. Distribution is modelled along classical lines, in particular in so far as real wages and profits are sequentially and asymmetrically determined.

Assume a single commodity, produced by means of homogeneous labour and circulating capital (the same commodity)—l, v being the required labour and capital per unit of output, per time period (with $v < 1$ for viability). The money price of output (P) is given by,

$$P = wl/[1-(1+r)v] \tag{1}$$

where w is the money wage. The uniform rates of real wages (w/P) and profits (r) are bound together by

$$w/P = [1-(1+r)v]/l \tag{2}$$

There is a minimum consumption per worker (c), below which the real wage cannot fall—with $c < (1 - v)/l$, for viability and positive profits. Hence the spectrum of feasible values for r is

$$[(1-v)-cl]/v \geq r \geq 0 \tag{3}$$

Output (Q) is determined by aggregate demand arising from private consumption (C), private investment (I) and government expenditure (G). All wages (after tax, at the rate t) are spent on consumption, and all net profits (also after tax at rate t) are saved. (The same applies below, to interest income.) Investment demand is determined by the replacement requirements of the current capital stock (vQ), and the additional capital required by firms' uniform expectation of the growth of demand for output (g_e):

$$I = v(1+g_e)Q \tag{4}$$

$$Q = C + I + G = (1-t)(w/P)lQ + v(1+g_e)Q + G \tag{5}$$

Substituting equation (2) into equation (5) and rearranging:

$$Q = G/[s - v(1+g_e)] \tag{6}$$

where s is the proportion of gross output not used up in induced consumption:

$$s = 1-(1-t)[1-(1+r)v] \tag{7}$$

the term in square brackets being (pre-tax) real wages per unit of output produced (equation (2)). The further restriction:

$$(s-v)/v > g_e \tag{8}$$

which makes the induced demand for output (per unit of output produced) less than unity, is required to ensure a meaningful solution. This assumption, together with the restrictions ensuring that s is less than unity, guarantees that the multiplier in equation (6) is greater than unity and finite. The money wage may also, for the moment, be taken as given and equilibrium requires equality between expected growth (g_e) and the actual growth rates of output demand and capacity (g).

Suppose three financial assets—stocks of outside money (H, with no income yield), government securities or bonds (B) and equity in the private capital stock in production (PK—price times the physical quantity of capital), all in money terms—and demand functions for those assets such as to generate desired proportions in which wealth holders will accept those assets, relative to after-tax private sector non-wage income. In equilibrium, these desired ratios (a_h, a_b, a_k), a function of yields, will equal the actual ratios of the stocks of assets held relative to net non-wage income:

$$a_h(r,i) = h/[(1-t)(rv+ib)] \tag{9}$$

$$a_b(r,i) = b/[(1-t)(rv+ib)] \tag{10}$$

$$a_k(r,i) = v/[(1-t)(rv+ib)] \tag{11}$$

where i is the yield on bonds, and h, b, v are the actual ratios of asset stocks held as a proportion of gross income from production (H/PQ, B/PQ, PK/PQ). In equilibrium also, net private investment plus the public sector budget deficit will equal net private saving, here expressed as proportions of gross income from production:

$$gv + (d+ib) = (1-t)(ib+rv) \tag{12}$$

where d is the primary public sector budget deficit—the budget deficit net of public sector interest payments—as a proportion of national income from production. Note that imposing constancy upon h and b in equilibrium renders public sector budget balance sustainable in the usual sense. Finally, the budget deficit is financed by issue of outside money and issue of government bonds, in proportions (γ, $1-\gamma$), respectively:

$$\gamma(d+ib) = hg \tag{13}$$

$$(1-\gamma)(d+ib) = bg \tag{14}$$

An intuition of the structure of this system and its proposed monetary equilibrium may be suggested as follows. Government policy is able to exogenously set g and i. The exogeneity of the latter is here a provisional supposition, relaxed in the next section, where the policy objectives or motivation associated with interest rate choice are considered. Summing equations (13) and (14) and substituting into equation (12):

$$(h+b+v)\,g = (1-t)(ib+rv) \tag{15}$$

With i and g given, equations (9)–(11) with (15) may serve to determine r, h, b and t. Assume there is a unique and stable equilibrium set of meaningful values for those four variables, satisfying these equations. (Intuitively, given an economically meaningful equilibrium value for the tax rate, it is being supposed that r, h, b can so vary as to bring desired and actual ratios of assets to income—all three presumed positive—into equality.[2]) With r thus determined,[3] the money price of output is determined (equation (1)). Note from equations (6) and (7), that G/Q therefore is also fully determined and constant in equilibrium, confirming a constant equilibrium value for the primary deficit, d. (When i is greater than g, equilibrium d may take a negative value.) The proportions in which the public sector deficit is financed by outside money and bonds are endogenously determined in accordance with equations (13) and (14)—a solution for γ, guaranteed meaningful, is entirely determined by h and b. Assuming equilibrium t is between zero and unity, the multiplier in equation (6) is satisfactorily determined, with the growth of G and Q identical: the growth rate of G is the instrument by which government achieves an objective with respect to g.[4] The growth of autonomous demand will be equal to, and determining, the growth rate of output. The value of g

[2] For simplicity, v is a parameter in our model. The possibility of v being variable, a function of r under conditions of multiple available commodity production methods was a crucial route to more orthodox results than those arrived at here—notably, a tendency towards full utilization of resources under competitive conditions—when combined with presumptions about capital–labour substitution in response to variations in the yield on capital (r here). In general frameworks with multiple produced commodities, these presumptions have long been exploded (see, for example, Garegnani, 1990; Kurz and Salvadori, 1995, pp. 427–467).

[3] The solution for r must be assumed consistent with restriction (3). That is to say, the interest rate chosen by government—or more realistically, by its agent the CB—together with the required margin between i and r, must not breach the upper bound of the spectrum of feasible profit rates. Hence Keynes's suggestion in the *General Theory* quotation in section 1—that expectations can validate 'any' value of the interest rate—must be qualified, even if the rest of his reasoning is sound.

[4] This can be interpreted as derivative from an unemployment objective. However, it would not really matter to the analysis if government instead had an objective with respect to t: the formal structure and solution would look essentially the same, but with t exogenous and g endogenous. Exogeneity of both i and b (or h) would be another matter altogether.

chosen—which could only plausibly be less than or equal to the growth rate of the workforce—must also be assumed consistent with restriction (8).

One further supposition implied by this model should be explicitly noted: involuntary labour unemployment is understood to be not automatically eliminated in a competitive economy. As the only primary input whose quantity supplied is not demand determined, labour is understood to be subject to no spontaneous mechanism bringing about balancing of its demand and supply. (Even though the growth rate is chosen by government, it easily can be imagined that a rate less than that required for full employment is chosen—e.g. if the tax rate associated with full employment growth is regarded as too high, by government or the electorate.) This in turn has implications for the treatment of money wages: under such conditions money wages cannot be flexible in response to labour demand-and-supply imbalances (i.e. money wage flexibility cannot be relied on to correct labour market imbalances). In an important sense, the money wage is indeed the 'nominal anchor' of modern monetary systems with inconvertible fiat money. The resulting impossibility of money wages obeying the traditional, common sense 'law' of markets—price falls (rises) in response to excess supply (demand)—does not rule out labour market (im)balance influencing money wages via its influence on bargaining power.

Note finally that inflation of nominal values could be allowed for in this framework. If commodity prices are inflating at some definite rate per time period—we need not enter into the possible causes of this—then any particular equilibrium of the system requires that money wages be inflating at the same rate. This generates the constant values for real magnitudes and ratios associated with an equilibrium outcome; but as will become evident below, this does not entail any variant of money neutrality. In the presence of inflation, policy will be conceived of as choosing or targeting a real rather than a nominal interest rate, so that the nominal rate set responds to inflation behaviour. To preview the argument of the next section, if actual inflation and real growth conform to government's desired levels (p^*, g^*), then the nominal interest rate is set so as to bring about a target real rate, i^*. In any case, for simplicity, in the following section stabilization of the interest rate is associated with achievement of a zero-inflation policy target, so that divergence between nominal and real magnitudes applies only in 'policy disequilibria' (if that term may be allowed).

3. INTEREST AS AN ARTEFACT OF CB BELIEFS

How then may Keynes's vision of the formation of a unique value of interest from among a feasible spectrum plausibly be characterized? A formulation

successfully capturing that conception should be able to allow for the two possibilities in the key *General Theory* statement repeated in section 1: that the prevailing rate, arising out of interaction between monetary policy and market expectations, may be the rate desired by the authorities—but if they act with insufficient 'conviction', 'persistence' and 'consistency of purpose', they may be overruled by contrary market opinion concerning the appropriate rate of interest. Such a formulation is offered here. This serves to provide a determination of the interest rate exogenously set in the closure of the model above. Pivetti (1991, pp. 135–136) has aptly summed up the implications that flow from a view of interest as conventional, together with CB behaviour placed at the centre of its determination:

> . . . interest rate determination amounts to a consideration of the wide range of policy objectives and constraints, under which interest rate policy decisions are taken. . . . We believe that . . . a thorough consideration of the circumstances that have governed the course of interest rates in the major capitalist countries . . . is bound to lead one to see clearly that interest rate determination is not subject to any general law.

What follows is an attempt to add something more definite than this; to formulate a systematic account of CBs' interest rate choices. To that extent, it goes somewhat beyond merely inserting a rate chosen by the authorities into a classical model, of one kind or another (that is to say, models exhibiting a degree of freedom in the determination of distribution). It is an attempt to develop a line of thought particularly associated with Panico (1988) and Pivetti (1991), they in turn pursuing a suggestion of Sraffa (1960, p. 33).

The set of possible objectives and possible constraints, which might serve to determine CB choice of an interest rate, of course is potentially large—which is precisely the reason why a 'general law' will not be available to theory. Already in the model above the spectrum of values which i can take is constrained by a maximum possible value of r, determined by technology and a customarily or socially given minimum consumption per worker. Further constraints could be added. Indeed, under certain conditions—e.g. a small economy with internationally open capital markets and subject to uncovered interest parity—the spectrum might reduce to a single value (with the interest rate choice occurring outside that small economy). Here, the constraints limiting the spectrum from which the CB can choose a rate are left at just those embedded in inequality (3), except for the potential role given to liquidity preference in the next section. The objectives of the authorities in principle could take many forms as well. In general they can be treated

by way of a reaction function showing the policy-determined interest rate as a response to the relation between 'the state of the world' and CBs' desired or target outcomes. In practice, CBs actually will be trying to respond to *forecasts* of the state of the world.

One example of such objectives would be a Keynesian 'cheap money' objective: 'whatever the state of the world, set i at the lowest rate from among the feasible spectrum'. Another would be a qualified cheap money objective, subject to an over-riding inflation objective: 'set i at the lowest rate from among the spectrum, except if inflation rises above p^*, in which case adjust i upwards by some definite formula'. Yet others would be a pure inflation objective: 'vary i by a definite formula, exclusively in response to deviations of actual (or forecast) inflation from a target inflation rate p^*', or a pure unemployment objective: 'vary i by a definite formula, exclusively in response to deviations of actual (or forecast) unemployment from a target unemployment rate u^*'. As yet another example, an objective of following the lead of the money markets also is quite possible: 'vary i by a definite formula, in response to changes in some weighted average of other market rates of interest'.

Consider now a characterization that captures the particular kind of objective commonly pursued *today* by CBs. We seek to investigate the *particular* 'law', one may say, governing i determination in the currently prevailing culture of CB beliefs (a 'law' that therefore largely is just a creature of those beliefs).[5] That objective in general may be described as CBs varying i in response to deviations of p from p^* and deviations of output growth (g) from a target growth rate (g^*), those rate variations being with respect to what they believe to be an underlying (but unobservable) unique, real 'neutral' rate (i^*):

$$i = (i^* + p^*) + k_p(p - p^*) + k_g(g - g^*) \tag{16}$$

where k_p, k_g are positive parameters. That is to say, today, CBs as makers of monetary policy typically have a form of Wicksellian belief system concerning the structure of the policy-relevant world (a possibility Keynes alludes to in the *General Theory* quotation in section 1)—plus definite objectives with respect to inflation and unemployment. (The growth target could be supposed derivative from an unemployment target.) This is the relevant 'policy regime'. Not surprisingly, in a matter so complex as monetary policy, there remain unsettled issues in this regime—e.g. the significance of asset-price versus commodity-price inflation. This characterization has three notable

[5] For simplicity, we treat the rate set by the authorities as identical to the rate on government bonds in the model of section 2. In more general settings, the term structure and wider structure of yields could be taken into account.

limiting cases, two of which already have been noted above: an inflation-only objective ($k_g = 0$), an unemployment-only objective ($k_p = 0$), and a nominal GDP objective wherein the CB effectively is giving equal weight to real and nominal deviations from target ($k_p = k_g$). For simplicity, the focus here may be narrowed to the inflation-only case—in the framework of monetary orthodoxy, the 'comparative advantage' of the monetary policy instrument is believed to lie in the pursuit of a nominal rather than a real objective.[6]

Our purpose is to outline the structure of this CB rate-setting norm, in accord with common contemporary monetary policy practice, and thereby to show the character of the 'general' solution for determining the path of the interest rate set by the authorities (i). (That is to say, 'general' in the context of those current norms.) More particularly, we show the possibility of: (1) a solution in which, in response to an inflation shock deviating inflation away from the CB's desired inflation rate, i changes in a manner which succeeds in restoring p to equality with p^*, with i returning to initial value, and (2) a solution of the same kind as the first, but with i at the end of the process stabilizing at a value different from its initial value. This serves to demonstrate the possibility of the level and course of interest rates being the product of a self-validating CB illusion—so long as any such interest rate paths are within the bounds of the spectrum of interest rates consistent with system equilibrium (as illustrated in section 2). For in either case 1 or 2, the CB would perceive its belief in a kind of Wicksellian world incorporating a unique equilibrium 'natural' or neutral interest rate as having been validated. The only qualification it would need to add is that in case 2 the real, underlying saving/investment (or supply of and demand for capital) conditions 'must have' changed over the period of i adjustment, so that the magnitude of the unique equilibrium real rate at the end of the process differs from that at the beginning. The Wicksellian (or otherwise traditional) theoretical framework—with its unique equilibrium real interest rate, when the economy is on its (effective) supply constraint—is treated as axiomatic, as if no other explanation of the particular rate that emerges under stable inflation were possible. But this is not so.

The structure can be described by three equations: (1) i as a function of i^*, p^*, and reactions of the CB to deviations of inflation from p^* (under the simplifying assumption of an inflation-only target), (2) i^* as a function of

[6] As a matter of fact, the illustrative model of section 2 supposes that fiscal policy can achieve a growth (and hence unemployment) target. More generally, if money wages in that model are growing at the same rate as p^*, and g in that model equals g^*, equation (16) serves to determine the government's chosen value of i in section 2—equal to ($i^* + p^*$).

past real interest rates, over a period in which inflation stabilized, and (3) p as a function of past changes in real interest rates. Taking each in turn:

$$\begin{aligned} i_t &= i^* + p_t + k_1(ep_{t+1} - p^*) + k_2(ep_{t+2} - p^*) + \ldots + k_n(ep_{t+n} - p^*) \\ i_t &= i^* + p_t + \sum k_i(ep_{t+i} - p^*) \end{aligned} \tag{17}$$

where $k_i \geq 0$ (with at least one positive) is the CB's period t reaction coefficient for period $t + i$ inflation deviations from target, and ep_{t+i} is the authorities' period t inflation forecast for period $t + i$ ($i = 1, 2, \ldots, n$).[7] Second, the CB must estimate an empirical order of magnitude for its illusory neutral rate notion, generally by seeking a value for the real rate of interest that is consistent with stable inflation, from historical data (e.g. Judd and Rudebusch, 1998, pp. 7–8). Such an estimation is closely analogous to empirical estimation of the NAIRU. It *assumes* the soundness of an orthodox (Wicksellian-type) theory, and infers that the average real interest rate over a set of previous time periods—*the most recent set*—in which beginning-inflation and end-inflation coincide, 'must be' approximately the unique equilibrium rate, associated with the economy being on its supply constraint.[8] For example:

$$\begin{aligned} i^* &= \{1/[q-(m-1)]\}[(i_{t-m} - p_{t-m}) + (i_{t-m-1} - p_{t-m-1}) + \ldots \\ &\quad + (i_{t-q+1} - p_{t-q+1}) + (i_{t-q} - p_{t-q})] \\ i^* &= \{1/[q-(m-1)]\} \sum (i_{t-i} - p_{t-i}) \end{aligned} \tag{18}$$

where the set of time periods starts with period $t - q$ and ends with period $t - m$ ($i = m, m + 1, \ldots, q - 1, q$—where $q > m$). Finally, one must suppose the existence of some kind or other of causal mechanisms whereby change in monetary policy influences inflation in the appropriate direction, presumably via (1) a negative influence of real interest on expenditure growth, and then (2) a positive relation between expenditure and inflation:[9]

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[7] Actually, setting nominal interest at i_t equal to $(i^* + p_t)$, in order to achieve the real rate i^* when forecast inflation is on target, is an approximation—satisfactory when i^* and p^* range over relatively low values. The true value of i_t to achieve i^* is $[i^* + p_t(1 + i^*)]$. See Pivetti (1991, pp. 52–58) and (Stirati, 2001, especially pp. 431–435) for important and detailed discussion of wage–price dynamics with a CB real interest rate target and positive inflation.

[8] Of course, even remaining entirely within the bounds of the orthodox theoretical conception, the real factors determining the neutral interest rate are subject to change, so that the *future* neutral rate appropriate to forward-looking policy may diverge from the past neutral rate. This is also precisely why, for historically estimating the neutral rate, CBs will prefer *the most recent interval* over which inflation has stabilized.

[9] This is in effect 'the transmission mechanism'. Both relations without doubt are highly contingent and variable (cf. Pivetti, 2001, pp. 115–116; 1999, pp. 296–297). The first could arise from: alteration of expenditure plans in response to what are perceived as temporarily abnormal

$$p_t = p_{t-1} + z + k^r_{t-1}\Delta r_{t-1} + k^r_{t-2}\Delta r_{t-2} + \ldots + k^r_{t-w}\Delta r_{t-w} \quad (19)$$

where z represents a possible, one-off inflation shock in period t (positive, negative or zero); Δr_{t-i} is the change in the real interest rate between periods $t - i$ and $t - (i + 1)$; and k^r_{t-i} (≤ 0, with at least one negative) expresses the impact on period t inflation of a change in real interest between periods $t - i$ and $t - (i + 1)$ ($i = 1, 2, \ldots, w$). In the absence of any inflation shocks (deviations of actually expected inflation from target), and with real interest rates unchanged over the previous w periods, inflation is on target and stable from one period to the next.

Taken together, these equations form a system in which interest rates react to inflation and inflation responds to interest rates. Given (1) inflation and interest rates over the past q or $w + 1$ periods (whichever is the larger), (2) the chosen time span m to q, (3) the w coefficients of the transmission mechanism, and (4) the value of any inflation shock in period t, then the so-called neutral interest rate and period t inflation are known. Given also (5) the CB's inflation forecasts for n periods forward, (6) its reaction coefficients for that time-frame, and (7) its target inflation rate, then period t interest is known. What kind of paths for p_t and i_t are generated by this system? The short answer is very many different possible paths! To illustrate how such a system may eliminate deviations of inflation from target, consider a very simplified case. Suppose inflation for the past two time periods has been stable and on target, with the target at zero—and that there are given initial values, i_{t-1} and i_{t-2}, assumed identical. The CB then calculates i^* from those two periods (i^* thereby being a known constant). Suppose further that the transmission mechanism involves current inflation being policy-influenced only by the change in real interest between the previous two periods (so dropping the time subscript on k^r_t), and that there is a one-off, non-zero shock to inflation in the current period t (z). That is to say, for the past two periods inflation has been on target and nominal interest rates have been stable—and there is an inflation shock in the current period. Finally, assume that CB policy reacts only to inflation one period forward—and employs equation (19a) to forecast inflation. More precisely, the CB knows the transmission mechanism linking Δr_{t-1} to p_t minus p_{t-1}—that is to say, knows k^r—but does not necessarily

interest rates; changes in net exports via exchange rate effects, when monetary policies are not globally synchronized; wealth effects and shifts in intertemporal budget constraints, when net asset holders and net liability holders exhibit asymmetric spending behaviour. The second could result from: the influence of expenditure growth on wage bargaining; the impact of variations in capacity utilization on firms' pricing behaviour (and perhaps costs); exchange rate effects. Note that the two causal linkages can be rationalized without recourse to orthodox monetary theory or the traditional marginalist capital theory, Wicksellian or otherwise, which underpins it.

forecast shocks accurately in advance (although this latter possibility is strictly irrelevant to the simple illustration here). This gives the following system:

$$i_t = i^* + p_t + k_1(ep_{t+1} - p^*) \tag{17a}$$

$$i^* = (1/2)[(i_{t-1} - p_{t-1}) + (i_{t-2} - p_{t-2})] \tag{18a}$$

$$p_t = p_{t-1} + z + k^r[(i_{t-1} - p_{t-1}) - (i_{t-2} - p_{t-2})] \tag{19a}$$

$$ep_{t+1} = p_{t+1} = p_t + k^r[(i_t - p_t) - (i_{t-1} - p_{t-1})] \tag{20}$$

$$p_{t-1} = p_{t-2} = p^* = 0 \tag{21}$$

Given known values for k_1, z and k^r, solutions for the paths of interest and inflation then can be determined. If there were no non-zero shock and hence ep_{t+1}/p_{t+1} conformed to p^*, inflation would continue at this level, with nominal and real interest also continuing constant, at $(i^* + p^*)$ and i^*, respectively. With ep_{t+1} differing from p^*, due to the non-zero shock (whether from the cost or from the demand sides is no consequence here), an interest rate reaction will be triggered, such that inflation converges back towards target and i_t back towards $(i^* + p^*)$.[10] At the conclusion of such an adjustment process the CB may continue to believe that i^* takes the value calculated from the experience of periods $t - 1$, $t - 2$. On the other hand, the CB may take the view that i^* should be recalculated on the basis of the average real interest rate over the interval from the time period prior to the shock, until the period at which inflation is restored (sufficiently close) to p^*—for reasons indicated in note 8. As real interest rates rise above (fall below) i^* during the adjustment to inflation above (below) target, that average real rate will be higher (lower) than i^*. Hence if the CB acts on this latter view it will proceed to enforce a higher or lower i^*, with all the consequences that flow from that (for distribution and so on), as illustrated in section 2. This would amount to a kind of 'hysteresis of yields', in so far as the level of i^* is being altered by the adjustment path itself—that adjustment path in turn resulting from the CB's targets and how it chooses to react to deviations from targets, together with the actual relation between interest rate changes and inflation behaviour. To be clear, this hysteresis would be occurring entirely within the belief system of

[10] Following a one-off shock, in this simple illustrative model inflation converges monotonically towards target, without requiring any restrictions other than those already specified; but one may add the requirement that parameters take values so as to ensure no negative nominal interest rates at any point in the process.

the policy-maker, not in the external world. Finally, a warning may be added concerning the determination of r in relation to i, in the terms of the model of section 2. The model determines equilibrium conditions without consideration of the time paths and lags involved in adjustment towards an equilibrium, when the independent variable i changes. In reality (in particular, allowing for fixed capital), only persistent changes in i can be expected to regulate r. Hence a monetary policy cycle could occur over a time-frame too short to warrant any such impact; but a monetary policy cycle leading to an alteration in i^* certainly would lead to such impact.

4. CAN MARKET SENTIMENT 'OVERRULE' MONETARY POLICY?

Once the CB's stance on pricing the security in which it trades is given and successfully implemented, i and everything that follows from it are determined. The motives, objectives, theories, models, econometric (and other) forecasts, and so on, which drive the authorities' choice of rate, suffice to 'explain' the determination of that rate—subject to constraints, and subject to exogenous shocks which cause or threaten deviations of actual outcomes *vis-à-vis* CB targets. But if the capacity of monetary policy to impose its will upon the money market in which it chooses to operate is subject to any doubt, then *perhaps* something more must be added. This opens a possible role for 'market sentiment', and hence for Keynes's 'liquidity preference', to influence the rate (rather than merely determining changes in the volume of private sector liquidity, at the CB's chosen rate).[11] We say 'perhaps' because on reflection it is difficult to see how today the authorities' will, as expressed in an interest rate intention, *could* be overruled by private sector market participants—keeping in mind that the two assets traded for each other in that market commonly are both creatures of government. The monetary authorities cannot really find themselves in short supply of either government securities or outside money. Therefore, whatever the demand/supply behaviours of other market participants, the authorities always have the

[11] A certain kind of liquidity preference (money demand) is included in the model of section 2 (equation (9)). But here, day-to-day money demand *in the market in which the CB operates* (or stands ready to trade) is being considered; in equation (9) it is *the total system money demand in the long run*. On the compatibility between the view of interest determination taken here and Post-Keynesian monetary theories (horizontalism, structuralism and a wider notion of liquidity preference), see the important argument of Lavoie (1996, especially pp. 278–281, 294–296)—which also provides an excellent overview of these literatures. Much of this concerns the determination of margins between yields, in models with heterogeneous interest-bearing securities and financial intermediaries.

wherewithal to make the market at a price of their choosing, so long as the implied interest rate is in the feasible spectrum. The possible role for market sentiment or expectations therefore is best characterized by giving the market's liquidity preference a role in the authorities' reaction function. In this way, liquidity preference, as a kind of constraint on the authorities, is 'internalized' in the authorities' beliefs. If, for example, liquidity preference reacts to monetary policy itself—at least over some range of values of i—and the authorities react to the scale of variations in the quantity of outside money in circulation, then a capacity for the market to *sort of* overrule monetary policy arises. In other words, if liquidity preference is in some measure a function of the stance of monetary policy,[12] and rate-setting monetary policy in some measure reacts to variations in liquidity, then liquidity preference may 'force' the authorities to back away from an interest rate setting.

Starting from an initial equilibrium i, suppose the CB seeks to reduce the rate 'dramatically'. To the extent that the new rate lacks credibility in the marketplace, there will be a more or less strong market conviction that future prices of the security will be lower. (An obvious example is monetary policy in a small economy with internationally open capital markets, attempting to set domestic interest rates substantially below world rates.) This provides incentive to shift out of securities and into outside money, in the conviction that capital gains can be made 'now', while restoring bond holdings 'tomorrow' (at least so long as expected capital gain exceeds any interest income foregone in the intervening period). This may 'overrule' the CB's initial interest objective because it regards the resulting increase in liquidity as unacceptable. It would then lower the price at which it is prepared to make the market in bonds, and so acquiesce in a rise in the interest rate. Strictly speaking, throughout the course of events in this thought experiment the authorities have complete control of the rate; but effectively, lack of credibility forces an *initially* undesired rate choice upon them. This is effectively a variant of the 'cheap money qualified by an inflation objective' case, mentioned in the fourth paragraph of the previous section—as the aversion to a too high growth of liquidity must surely be linked to its perceived implications for future inflation, rightly or wrongly. If the private sector exhibits a sufficiently large increase in liquidity preference in response to the attempted reduction in i, achievement of the reduction will fail. It is ignorance of what the private sector's subsequent response to a certain reduction of i will be,

[12] Keynes remarks on this possibility himself, in terms of discontinuities in money demand as (quantity-setting) monetary policy is altered (Keynes, 1936, pp. 197–198), close to the quotation from the *General Theory* in section 1. This, incidentally, also implies that while there is an IS-like relationship in the *General Theory*, the presence of a well-behaved LM-like function is somewhat more questionable.

together with the CB's own aversion to liquidity growth, that provides the real explanation for the bank being 'overruled', in a certain sense. If this eventually influences also the CB estimate of i^*—or otherwise determines the value at which the CB-set real rate trends—then to that extent r and everything that follows from it, in the model of section 2, will be determined by 'market sentiment' as well.

Is a 'too high' CB-nominated rate—lacking credibility in the opposite direction—similarly possible? In this case there would be a motive for other market participants' shifting out of money and into securities, in the conviction that capital gains can be made from the expected rise in prices 'tomorrow'. To the extent that the CB is unlikely to have the same concerns about a drain of liquidity from the system as it might about growth of liquidity, the situation seems not to be symmetric; so that one would expect expectations to come into line with policy. It is cheap money, not dear money, which may be prone to being contested by market sentiment—as indeed Keynes's *General Theory* statement quoted in section 1 implies. Nevertheless, his measured optimism concerning the capacity of a sophisticated monetary policy to get its way seems justified in a system with multiple possible equilibrium interest rates. Market sentiment has no objective basis for contesting the authorities' rate choice in such a system—other than a notion of 'normalcy' which can hardly be more than an artefact of previous experience—and therefore market sentiment amounts to a set of expectations susceptible to alteration by just the sort of careful pushing and prodding by policy that Keynes advocates.

The capacity of monetary policy to enforce a yield in the market in which it operates, and thereby to shape interest rates across the term structure (and beyond, to equities and all other yields on capital assets), evidently hinges upon its capacity to shape interest rate expectations to a conformity with the authorities' desired interest outcome. In this sense, credibility is indeed decisive for monetary policy, though not in quite the sense in which 'credibility' and 'reputation' commonly have been deployed in recent monetary policy literature (see Forder, 2001). In this regard, a comparison of interest rate setting with CB forays into exchange rate setting or exchange rate targeting is instructive—because an insight into the capacity of CBs to shape interest rate expectations can be gained from a consideration of their *lack* of a similar capacity to so easily shape exchange rate expectations. The instances of market sentiment overruling CBs' objectives in foreign exchange markets are not matched by similar evidence of market opinion overruling monetary policy targets in the money markets in which interest rate setting is executed. This difference arises, first, from the fact that in most circumstances CBs do not control issue of both assets traded in a foreign exchange market (but even

coordinated CB foreign exchange interventions can be problematic). Second, in the case of exchange rates the markets have some objective bases for forming expectations of prices—purchasing power parities, interest rate differentials, current account trends, and so on—independent of CB targets. This can give market opinion an independent basis to contest CB opinion, as to the appropriateness of an exchange rate. In short, objective conditions more stringently govern feasible exchange rates than feasible interest rates; in general there are not multiple exchange rate equilibria. From this vantage point, the ease with which monetary policy sets interest, relative to its difficulties in pursuing exchange rate objectives, in important part resides precisely in the lack of any objective, independent bases for the formation of interest rate expectations as opposed to exchange rate expectations.

To be sure, in a system of globally integrated financial markets, the scope for national monetary policies to set interest rates is greatly curtailed; but this simply shifts the degree of freedom to a different level. In a strictly globally integrated financial system subject to free competition, in general there is only one degree of freedom in the setting of global yields; but the existence of psychological impediments to global capital market perfection (risk aversion, preferred currency habitats, and so on) leaves some scope for manoeuvre. Whether or not some scope is left for more than one independent national monetary policy to operate, the essential logic of the situation would be the same: in a globally integrated closed system with multiple intersecting currency areas, the determination of yields would remain in the preserve of monetary policy and market sentiment. The key further questions raised would be: how many monetary policies; and whose monetary policies; and how effective *vis-à-vis* market sentiment, when monetary policy is not in the hands of a singular monetary authority (cf. Aspromourgos, 2004, pp. 232–233)?

It may be added that our supposition of rate-setting policy does not merely assume the theory of interest that we are seeking to advance. CB practitioners affirm that monetary policy operates, must operate, via rate setting; that it would be practically impossible for it to be conducted otherwise. But most of those same bankers endorse traditional monetary orthodoxy, in the sense that they believe CB rate setting ultimately will be subject to the discipline of the underlying real forces supposed by traditional marginalist theory ('productivity and thrift', in the old shorthand). Rate-setting policy is understood as merely bringing about temporary or short-period deviations from the underlying unique equilibrium real rate, the determinants of which are independent of monetary forces. As has already been indicated, this is closely analogous to deviations of actual unemployment from the NAIRU, more familiar from contemporary academic macroeconomics; and it is no surprise,

therefore, that Friedman (1968, also 1966, pp. 55, 60–61) coined the concept of natural unemployment by explicit analogy with Wicksell's natural interest (cf. note 1). In orthodox macro-models, a well-defined IS function ensures that inflation behaviour can be treated, interchangeably, in terms of disequilibrium unemployment deviations or disequilibrium real interest deviations. The specification of the policy instrument—interest rate or (change in) quantity of outside money—does not foreclose the issue of whether equilibrium interest is unique, or multiple and hence conventional. Nor does the existence or otherwise of multiple interest rate equilibria decide the question of instrument choice. How far the mainstream of monetary analysis has come on this issue since the high-water mark of monetarist-inspired monetary targeting is well illustrated by Blinder's view as summarized in Richard Layard's foreword:

> . . . the choice of monetary instrument . . . must be the interest rate rather than any monetary aggregate. The reason is quite simply that money demand functions are impossibly unstable and that for most periods money is not even cointegrated with income. . . . Thus Blinder dismisses old-style monetarism on the basis of Poole's original analysis of functional instabilities.[13]

5. INTEREST AS A CONVENTION

In its essentials our conception of interest as a convention may be stated in two steps. First, under competitive conditions the level and structure of equilibrium yields on capital assets exhibit (at least) one degree of freedom, subject to certain objective and conventional constraints. Second, the independent yield is determined by the belief-systems of CBs—both their objectives (or values) and their understanding of the actual objective structure of the relevant world in which monetary policy operates, these two dimensions being generally interdependent.[14] This may be called a *policy regime*. Those beliefs are also subject to the objective and conventional constraints. As in general the constraints do not impose a unique outcome upon the rate set by the authorities (and hence also no unique solutions for the entire level and structure of yields), this makes interest *conventional* in the strict sense of that

[13] Blinder (1998, p. x). The allusion is to Poole (1970).

[14] Certainly, at minimum, one's understanding of the actual structure of the external world influences one's values. A belief in the neutrality of money naturally favours a belief that monetary policy ought to target inflation.

term: 'an arbitrary rule or practice', 'arbitrarily or artificially determined'.[15] False beliefs about the actual structure of the world can be validated in such a framework. In the manner of any system of multiple equilibria (and, in the purely formal sense, multiple possible rational expectations), the indeterminacy of the world and its outcomes make self-validating beliefs possible, including self-validating false beliefs. Traditional monetary orthodoxy appears to be just such a set of false but quite possibly self-validating beliefs. It has been shown in section 3 how this may lead to a hysteresis of yields—a change in the trend real interest rate, as a result of the monetary policy adjustment process itself. In more realistic processes, stretching over many twists and turns with regard to shocks, this possibility will look more plausible than it does in that very simple illustrative model.[16] On the other hand, our use of that merely illustrative model to show how monetary policy *could* succeed in restoring inflation to target following shocks—even in a non-orthodox theoretical universe with no unique equilibrium real interest rate—does not entail believing that such monetary policy conduct in pursuit of an inflation objective is always and everywhere so unproblematic. The contingency and variability of the elements of the transmission mechanism (see note 9)—combined with the pressure *persistent* movements in interest place upon profits and money prices in the same direction (see the comments at the end of section 3)—means that validation of CB beliefs is possible, but not inevitable.

Our theoretical framework of section 2—illustrating a synthesis of ideas from Keynes and Sraffa—allows a spectrum of interest rate equilibria, and shows how Keynes's notion of interest as a convention, and the two possibilities for its determination, may now best be understood. The theory of interest thereby becomes an account of the determination (or 'selection') of the particular rate which emerges from the interaction between CB policy and market sentiment, as discussed in the subsequent two sections. But precisely because market expectations have no objective or 'natural' moorings in a world of multiple feasible rates, the capacity of careful and considered monetary policy to have its way is virtually complete—although it remains possible in principle for market expectations to prevail over monetary policy, in a certain sense. So long as the authorities' interest rate choices do not involve

[15] These are from the *Oxford English Dictionary* definitions of *convention* and *conventional*, respectively.

[16] For example: in the 1970s inflationary shocks occur; this becomes the practical catalyst for a crisis of 'Keynesian' policy and monetarist 'counter-revolution', which, together with a neo-conservative political ascendancy, leads to an era of high real interest (Volcker, Thatcher, Reagan); then there are deflationary impulses in the 1990s and beyond (bursting asset bubbles, Chinese manufacturing exports); these in turn lead to an era of low real rates.

dramatic or abrupt departures from market expectations, and do not transgress other constraints defining the available spectrum of rates, their rate choice is the only mooring for market opinion, in a closed system. And if the CB thus has its way, the only 'true model' the other market participants need be interested in, in forming their interest rate forecasts, is a model accurately capturing the bank's rate choice, as formally illustrated in section 3. The course of interest rates is a result of CB beliefs and contingent shocks, though subject to objective and other constraints.[17] To refer back to our opening paragraph, what common sense sees is all that there is: at any point in time, interest rates are merely the outcome of supplies and demands in money markets—with the CB the comfortably dominant market maker in one segment of those markets.[18] There is no anchor via deeper underlying forces.

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[17] One can then say, alluding to the quotation from Pivetti (1991) at the beginning of section 3, that any particular episode of interest rates has its own contingent history. 'Historical inertia' plays a big part, particularly when one recalls also that central banks typically (and sensibly) engage in interest rate 'smoothing'—something that has not been incorporated in the treatment of policy here.

[18] To call these results a 'monetary' theory of interest, as has been the usual characterization of Keynes's position in the academic literature, is not really appropriate or useful: the distinction between 'real' and 'monetary' causes or forces presupposes the dichotomy associated with money neutrality; and in the absence of that dichotomy, there is no real sense in counterposing real and monetary explanations of interest.

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