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Traditional Notions of Equilibrium Reconsidered*

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I.

Over fifty years ago Lionel Robbins, with "On a certain ambiguity in the conception of stationary equilibrium", introduced to readers of the **Economic Journal** what he clearly felt to be an essential but unrecognized dichotomy in the recent modelling of economic behavior. (Robbins, 1930. 194-214) The original distinction drew upon a contrast between 'static states' according to propositions about supply schedules of the various factors' of production. The recognition, in which two traditions of economic thought are identified, entailed a break, **circa** the 1890's, in the manner in which population and capital in particular enter the framework of stationary state equilibria. In the first--a Ricardo/Mill/Marshall line--the factors of production are allowed to vary and are **not** a datum of the analysis, through the movement toward a stationary state. In the second, established with Bohm-Bawerk, Clark and Wicksell--the factors in question are rigidly fixed by presupposition and equilibrium is obtained while holding the amounts of labor and capital constant. Thus while both traditions characterize the stationary state by unchanging factor supplies, in terms of Ricardo-Mill-Marshall formulation, this constancy is an outcome of the equilibrating process, while in the Bohm-Bawerk-ClarkWicksell model it is both a postulate and a condition of the idea of equilibrium itself.

This paper undertakes, first, to resurrect and elaborate upon the Robbins-dichotomy and second, with the benefit of hindsight, to propose that the implications of this distinction are not always clearly seen or fully appreciated. The late nineteenth century shift in the corpus of economic theory apparently rests not with the extended use of supply and demand mechanisms--these were simply **pro forma**-but the adoption of different kinds of capital-theoretic frameworks and different perceptions, so often confused, of stationary state equilibria. The result suggests a gradual development not only of significantly distinct notions of profit rate equalization but of the accumulation of capital and technical change as well. Our intention is to articulate a line of research which appears to shed considerable light on the origins and content of modern theories of

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growth and suggests a reconsideration of both the importance and interdependence of growth and allocation mechanisms in so-called `classical' economic theory. A final section extends this perspective to interpret Keynes.

A look at some of the recent literature on the history of capital theory should further clarify, albeit in terms mostly of counter-example, the Robbins-dichotomy. I have in mind the work of Pierangelo Garegnani. The dominant characteristic of economic thought from Ricardo to Wicksell--including Mill, Marshall, Bohm-Bawerk and Clark, is in Garegnani's view, a common analytical structure which distinguishes between short and long period positions or market and natural prices. Associated with such a structure is a stock of capital which, in one way or another, has been so `adjusted' over `time' as to yield a uniform rate of return throughout the economy on all kinds of capital goods. Long period positions or the prices which qualify, in this vernacular, as `centers of gravitation' are thus those consistent with a proportion of fixed to circulating capital in each industry which assures profit rate equality and cost-covering receipts for all producers.

A second line of economic thought, which Garegnani sees as a quite different theoretical approach, originates with Walras and extends through Hayek, Lindahl, Arrow and Debreu. Its chief characteristic is the now familiar system of general `intertemporal equilibrium' in which a price is determined for each good and for every possible time period, from the present through the future. Accordingly, capital goods earn only rentals, the structure of the capital stock may be in any proportion whatsoever and each commodity has, by definition, its `own-price rate of return' across `time' periods. Hence there exists no tendency toward a uniform rate of profit and the entire distinction between short and long periods falls completely away.

To be more specific, Garegnani sets out his view of the past in terms of two main types of analyses: that of Knut Wicksell and that of Leon Walras. In terms of the Robbins-dichotomy, both are nevertheless--as will become clear--consistent with the `fixity' of factor supply point of view. The Wicksellian frame of reference begins with the recognition that capital goods, and the total quantity of (value) capital they represent, are the result of past savings. At any point in time, these past savings are `incorporated' into specific kinds of capital goods--machines and the like. With the productive use or depreciation of such goods past savings will periodically re-emerge in a `free' form" and, accordingly, can either "be re-incorporated into capital goods of the same or different kinds" or turned back into present consumption. A uniform rate of return **as a condition of long period equilibrium** thus requires the flow of capital from low to high profit industries--in a supply and demand framework--until the resulting proportion and distribution of capital goods is appropriate to the set of long period prices.

Wicksell's procedure, and this is the key point, is to take the total quantity of value capital as a **datum**, but to allow the specific mix of capital goods to change, to become compatible with long period equilibrium, as `free' capital is `reinvested' in the appropriate sectors and techniques. With profit rate equality, as Garegnani remarks, "it becomes

impossible to take the physical goods as given." It is the "capital incorporated in such goods, i.e. their value," that must be held constant. What remains is thus a total demand for capital as a **stock**, where its quantity employed--given the quantitis of all other factor supplies as well--varies inversely with the rate of interest or profit, and **not** a demand for capital as a **flow** in the form of new or net investments.

Walras' method, on the other hand, is somewhat the reverse. The capital endowment of the economy is "seen as a set of given quantities: as many as there are kinds of `capital goods proper'." With the structure of the capital stock fixed by presupposition no move toward profit rate equality, no change in the composition of capital goods among industries is possible. Unless, in other words, the proportion of fixed to circulating capital is appropriate to a long period equilibrium to begin with, there is no mechanism by which such an equilibrium can ever come about within the static context. There is, in short, no need to calculate the value of the capital stock because there is no means by which it can be transferred from low to high profit techniques. The final form of the distribution of capital goods per se is, as the postulate of equilibrium, complete well before the analysis begins.

The alternatives that remain within these perspectives are clear. If one wishes to maintain the tendency toward a uniform rate of return on the **entire** capital stock, a) the value of the quantity of capital must remain fixed while b) the composition of particular capital goods varies in accordance with the move toward long period equilibrium. The Wicksellian method requires an aggregate measure of capital, independent of its `supply price', so that a determinate rate of interest can be established through the equality of the (inelastic) supply and demand for (value) capital. The Walrasian approach, alternatively, a) takes the physical endowment of each capital good as given and b) thus precludes any move toward or establishment of long period profit rate equality. A measure of the total quantity of (value) capital is thus superfluous.[1]

The origin and direction of `neo-Walrasian' or `intertemporal equilibrium' can, within this context, be easily identified and understood. To avoid, in part, a theoretical problem long recognized as intractable namely, the impossibility of the to measuring a quantity of capital in value terms outside of a `one-commodity' world irrespective of circular appeals to market valuation and without the associated problems of capital reversing and reswitching--the distinction between long and short period equilibria was abandoned. (Hicks, 1946, 187-90; 205-07). Following the static Walras and given a desire to introduce expectations more formally, equality of the profit rate was replaced with as many different rental-prices as there are capital goods, essentially now on the same footing as natural resources, within the economic system. (Petrori 1978; 225) Commodities are completely valued and dated, for all periods, either through the mechanism of perfect futures markets or under the assumption of

[1]The problems arising with capital in this sense apply just as much to traditional long-period neoclassical theory of the disaggregated Wicksellian type as they do to contemporary neoclassical aggregate growth models.

myopic-expectations--within the stringing together, in sequence, of a series of 'temporary' equilibria. Aggregation is unnecessary and some mythical notion of a quantity of capital is unwarranted.[2]

Before returning to the Robbins-dichotomy I would like to summarize--in a way I think that will surprise very few--the character of the Wicksellian and neo-Walrasian approaches, when placed in the growth context. The perfect markets framework of the latter is well recognized to be a totally timeless construction--its only 'time-like' extension being a notion of a commodity which includes a date (not related to the calender) of delivery as its defining characteristic. In its temporary equilibrium 'approximation' the neo-Walrasian frame of reference is subject to many of the same limitations--some recent contributions aside--as its Wicksellian counterpart. The best that can generally be hoped for are comparative static results. To link equilibria together--either in terms of rounds of new expectations or with different initial endowments and/or particular steady state growth rates of total capital--says nothing about the growth process unless it can be shown how an economy actually moves from one equilibrium to another. (Hicks, 1979: 56-58)

Moreover, even in terms of comparative statics, the Wicksellian model still requires one to be able to determine between two 'static states', whether or not the values of capital in one state is greater or less than the amount in the other--and this is exactly what it cannot do in any precise theoretical way. (Robinson, 1970; 309-317). To assume homogeneity and 'leets'-malleability does away with the problem of measuring the stock of capital as well as degree of utilization, problems with disappointed expectations, the extent of factor substitutability and the proper underlying short period/long period adjustment mechanisms--but it also does away with the conception of accumulation as a historical process. (Robinson, 1970, 1975). In short, the results here have been markedly disappointing and the literature has been left with a kind of Hobbesian choice: either one adopts the long-period Wicksellian procedure and faces the capital problem or, alternatively, one uses the 'temporary equilibrium' method and accepts that final results depend critically upon the nature and kind of subjective expectations presupposed (Hahn, 1973, 1977). The remainder of this paper, per contra suggests the relative neglect of an **alternative** long-period theory, one perhaps more suited to the study of non-static behavior.

II

The key problem with the Garegnani view of the past, as I see it, is the absence, or at least the relative suppression, of a Robbins-type

[2] As Milgate remarks (1979: 9) "It should be clear from our discussion that to represent the development of economic analysis from 1870 down to the present day as a process of "progressive formulation" is seriously to obscure the fundamental shift in the notion of intertemporal equilibrium. One often hears the claim that modern economic analysis deals with "more complex" questions (that is, "general" as opposed to "special" cases) than did the economics of the nineteenth and early twentieth century. It would be more correct to say, however, that it deals with an entirely different question."

distinction between the two kinds of stationary state equilibria. To characterize, for example, Wicksell and Marshall as having identical methods regarding the theoretical use of capital is, I believe, to ignore the fundamental change which took place regarding the notion of long-period equilibrium, its consequent stationary state and the meaning of and manner by which profit rate equality comes about. The alternative approach--in line with the Robbins-dichotomy--suggests a Ricardo/Mill/Marshall tradition which, on close examination, turns out to be a kind of amalgam of the Wicksell and Walrasian approaches which Garegnani articulates, with the essential proviso that in no sense is either the stock of capital in value terms or the number of kind of each capital good taken as a datum of the analysis.

The following aspects characterize the Marshallian tradition:

(1) While a stationary state in its ultimate sense (ie. the distinction between market and natural prices is not relevant) is defined by a zero-rate of net-savings, long-period equilibria and their corresponding natural rates are generally established and consistent with **net** capital accumulation. Long-period equilibria, in short, are generally non-stationary.

(2) Since neither the existing capital structure nor the volume of value-capital in the aggregate are taken as given, profit-rate equality--the tendency in response to differential rates of return--is established not on the **entire** capital stock but only on its margin, so to speak, in the form of gross investment, where the latter includes net savings, depreciation of existing stock or "free capital" and any previously idle or unemployed funds transferred through the credit mechanism.

(3) While adjustments take place--movements from short to long period positions--at the margin of the stock of capital and in terms of gross investment, the bulk of production is done by existing 'vintages', which earn quasi-rents as long as costs of production make further changes in output possible.

(4) Accordingly, no necessity to measure the total quantity of capital is implied since there is nothing in the analysis which requires the construction of supply and demand relations for the stock of capital as a whole. Instead the emphasis is on gross investment, vis a vis the supply and demand for investible resources, and the determinants of long-period 'natural' rates of interest. In other words, the construction of some kind of relationship between the rate of return on capital and its aggregate value--the method of Wicksell--is, in this context, a non sequitur.

(5) The notion of a 'marginal' product of capital or labor is ambiguous here as long as production takes place in an on-going process of new accumulations or, stated differently, when the amounts of capital and labor are long-period variables--with supply prices--determined endogenous to the general system of growth and allocation. As Marshall remarks in regard to a particular laborer, the "net product of his work has by itself no real meaning since in order to estimate net product we have to take for granted all the expenses of production of the commodity on which he works, other than his own wages." (Marshall, 1920, 473).

(6) The structure of capital involved in production at any one point in time represents an amount of gross **past** investment, based on expected rates of profit, technique and levels of demand present at the time those investments were made. And finally,

(7) Technical advance itself is seen to take place largely in the context of new investments, while transfers of resources among sectors usually manifest themselves in improved methods of production, with greater productivities, and hence further potential for additional net accumulation.

Let us step back and approach this somewhat differently. According to this view, market prices in `classical' theory (i.e., what I have been calling the `Marshallian tradition') depend both upon the pattern of current demands and the particular structure of capital inherited from the past--the method of the `static' Walras. Prices will be above or below their `normal' levels to the extent that the structure and composition of capital in the economy is not appropriate to the levels of demand consistent with long-period equilibrium. Adjustments in response to differential returns depend critically on the rate and composition of gross investments and these adjustments, in turn, are presumed not to be instantaneous precisely because they are limited by gross investment itself--the amount of investable capital available at a point in time is necessarily insufficient because part of the stock has been fixed in the past to a particular employment (Marshall, 1920; 340-42).

Now because gross investment generally includes net savings here, the quantity of capital' in the economy is gradually changing. And, it is investment itself that affects the structure and composition of this total and growing stock--but not in terms, most importantly, of a uniform rate of return over the supply price of **all** capital goods.

Rather, **equilibrium is established**--given an `effective desire of accumulation' in Mill's terms, or a supply price of `waiting' for Marshall--**when the composition of investable funds is such that the structure of capital in the economy remains unchanged.** The more expected rates of return on gross investment over alternative projects approach uniformity, the less will be the incentive for investment to alter both the composition of capital and its distribution in the economy as a whole. Long-period equilibrium is thus not necessarily--and generally is not-stationary.[3] Accordingly, the natural or long-period rate of interest, characteristic of this equilibrium and toward which, given costs, the economy moves, is determined through the general interaction of the supply of savings--which

[3]·Marshall (1920: 443, 492). Again, this is quite contrary to the conventional point of view. See, for example, Stigler (1941: 344-56); Garegnani (1976: 34); Milgate (1979: 1-2); Hicks (1965: 45-57) and Hicvks and Hollander (1977: 360-61). There are two (qualified) exceptions: Robinson (1973: 13-14) and Whitaker (1974: 9). In the latter, for example, on Marshall: "...the nominal rate appears to be interpreted as the slowly-changing trend value of the interest rate in an ongoing process of steady capital accumulation The fact that the capital stock fails to settle at an unchanging normal level is in disagreement with the idea that normal equilibrium involves full adjustment...This is exactly my point.

includes net savings and which depends upon the rate of interest and subjective determinations regarding the desire to forego present consumption--and the demand for investable resources--which includes net accumulations and which, in turn, depends upon the rate of interest, the costs of production and the prevailing technology. The fundamental inverse profit-wage relation still holds its importance here.

Fixed capital, as such, and to the extent that it depreciates over time, receives a return having the characteristics of rent, which itself depends both upon the wage rate and the pattern of demand. And the real wage, finally, given mobility, is determined by the supply and demand for labor, where the former (in part) depends upon the structure of capital inherited from and determined in the past and the composition of gross investment, between fixed and circulating uses, in the present.[4]

Now, if the view I have of this tradition is correct, what we obtain is a kind of general interaction, an interdependence between theories of growth and allocation on the one hand and market and natural prices on the other--a picture quite contrary to the conventional view. Gross investment is **allocated** (to the extent that it reflects a depreciation of existing fixed capital and misappropriated circulating capital) to those sectors in which market rates are above their long-period levels. From the perspective of individual actors, differential rates of return on investment (as proxied by the current market rate of interest and given habitual standards as to what an acceptable rate of return should be) are a signal for output variations, via (again) gross investment, and a move toward long-period equilibria (as defined).[5] Changes in natural rates, in turn, affect market prices through the usual and appropriate gross investment adjustments. Thus, although market and natural rates are largely determined by different forces, there exists a general interaction between the two such that, as Mill concludes, at any point of time a particular market price "very seldom coincides" with its natural level. (Mill, 1964, 473). The operative presupposition here--I would add the key presupposition of all of `classical' political economy, is not that natural rates are fixed, but they are stable

[4]In the context of the dynamic Walras, this is what Lutz (1967: 81) has called a `sort of loanable funds theory'. Of course the issue here is the real, not market, rate of return. The underlying mechanisms are also quite different.

[5]·There is,f as I see it, some ambiguity with respect to Keynes here. His criticism of Marshall on interest is well known, but in terms of capital theory (generally) there is a good deal of affinity. Both Marshall and Keynes deny the possibility of a unique measures of roundaboutness. Both rely heavily on notions of scarcity and quasi-rentals and, at one point, Keynes remarks--in reference to Knight and the rate of interest--on "the soundness of the Marshallian tradition as to the usefulness of the Bohm-Bawerkian analysis." Keynes (1973: 176, n. 3).

in the strict sense that they do not completely roll over or swamp short-period effects. What better manifestation of Marshall's **Natura non facit saltum** could there be?

III

Conventional representations of Keynesian economics presuppose some set of fixed prices to generate equilibria with sustained unemployment. The framework is typically cast in terms of a `one-good model', with an aggregate production function to tie total output to the labour market. If the real wage rate is set above its market-clearing value--the operative assumption which separates Keynes from the Classics--permanent excess supplies of labour result.[6] Alternatively, complete price flexibility, ensures an equilibrium at full employment which is both stable and unique. The perspective of this paper, however, suggests that the essence of Keynes may lie elsewhere. The theoretical context, which can only be sketched here, is one which, first, tries to drop the assumption of a Walrasian auctioneer in relative price determination and, second, attempts to incorporate the effects of varying expectations in a more explicit and fundamental way.

Although rarely distinct or well-defined, Keynes appears to model expectations in the **General Theory** in three different ways: long-period expectations exogenous with short-period realized; short-period unrealized with consequent effects on long-period expectations; and changes in long-period which alter short-period expectations. (Kregel, 1976) Clearly much of the **General Theory**, particularly as it relates to the notion of effective demand, runs in terms of the first assumption. Expectations which are time-independent allow one to construct a system with determinant aggregate supply, consumption and investment functions--a theory of output as a whole. The question, in this context, of price flexibility fades in importance relative to firms' estimates (assumed always to be realized) of current demands for goods and services. Full employment vis a vis these estimates is, of course, not generally guaranteed. Effective demand, in the vernacular, "rules the roost".

Nevertheless, much of the Keynesian message rests as well on a world with unrealized short-period expectations. Functional relationships can still be specified, but output adjustments in response to errors in perceived demands bring both the multiplier and the marginal efficiency of capital to the center of analysis. With the short- and long-period no longer strictly independent, one obtains a kind of "rowing-equilibrium" where unrealized outcomes affect both current outputs and, as they alter long-period expectations, demands for capital goods in general. Long-run equilibrium as traditionally defined is no longer stationary since changes in investment, stemming from the disappointed present, are affecting both the stock and structure of capital as a whole. The parallel with Marshall is striking! And, finally, the idea of equilibrium itself falls away as changing views of the future, the third model, influence short-period estimates themselves. Keynes on the trade cycle seems to fit most appropriately.

Let us step back, however, to see how this `new' view of Keynes fits (at least in part) a market economy in the absence of an auctioneer. Take the case of an exogenous increase in savings. (Leijonhufvud, 1969; 70-73) Individual consumers are foregoing present consumption, and accumulating assets, with an eye toward turning resulting streams of income back into future consumption. Firms, ideally, should revise their estimates of future demands for goods and services upward, with the composition of current output switching from more (excess demands) capital to less (excess supplies) consumer goods. In a perfectly coordinated, neo-Walrasian system one would expect market-clearing tatonnement with both a higher price of capital relative to consumer goods and a lower rate of interest.

But the Keynesian story is much different. For individual producers, the increase in savings is seen as a direct fall in the demand for current/consumables. Short-period expectations are unrealized, with consequent falls in output and employment. But unrealized short-period expectations force firms to revise their estimates of long-period returns. To that extent, the demand for capital goods falls as the marginal efficiency of capital in general decreases. The fall in investment expenditures, in turn, affects both current aggregate demand and--since the stock as a whole is changing--the marginal efficiency of capital itself. Long-run equilibrium once again is, by necessity, non-stationary. Thus, without the auctioneer, lower long-period expected returns will result not in a rise, but a **fall** in the price of capital, i.e., its **relative** price will move below its equilibrium, full-employment value. Further, interest rates will not fall sufficiently since rising security prices and falling yields will instead induce speculators to sell bonds and hold deposits--indeed, a rising `liquidity preference' follows, for Keynes, a collapse in the marginal efficiency of capital. If interest rates are not as low as they need to be, the price of capital will, again, not be sufficiently high. The proper coordination of savings and investment decisions is clearly missing. (Keynes, 1973; VII 145-6, 173, 212, 316).

There are three lessions to be learned from the above exercise. First, contrary to the conventional representation, it is relative not absolute prices (and how they connect with varying expectations) that are important in the explanation of unemployment equilibria. Second, the presence of money (financial instruments and institutions generally) matters First, contrary to the conventional representation, it is relative not absolute prices (and how they connect with varying expectations) that are important in the explanation of unemployment equilibria. Second, the presence of money (financial instruments and institutions generally) matters fundamentally. As is well known, a full-information, perfectly-coordinated Neo-Walrasian system requires a complete set of futures markets for intertemporal consistency. Indeed, if individuals accumulated such contracts for specific goods through time when they save there would be no reason for producers to revise their expectations of future demands downwards. But consumers, instead, choose to command wealth in general with the opportunity of consuming unspecified goods at an unspecified time. (Leijonhuvud, 1969; 71). And, third, the analysis--contrary to the conventional--is not short run, in the sense that neither the stock of capital is held constant nor are long-period expectations always assumed fixed.

IV

This research points to a number of conclusions, each with varying implications. First, there are in thought different kinds of stationary state equilibria in the history of economics. The theoretical structures and propositions generated by each are significantly distinct. The Marshallian tradition is perhaps best understood as a system of short-period theory with long-period moorings--but without the defects in capital characteristic of its Wicksellian counterpart. The stock of capital is neither fixed in value terms nor are long-period equilibria defined by a zero-rate of net savings. Expectations enter, for better or worse, not just on a subjective footing but also through an objective and underlying tendency toward profit rate equality on new investments. And natural rates themselves are compatible with a capital stock **not** fully adjusted to the requirements of long-run equilibrium--in the sense of traditional neoclassical theory--with a uniform rate of return over the supply prices of **all** kinds of the various capital goods. It is, in short, not the tradition nor the method of Hicks of the **Theory of Wages**, i.e., of Wicksell and Pigou or of Hicks of **Value and Capital**, i.e., the `static' Walras.

Second, conventional representations of `classical' theories of growth tend to dichotomize market and natural rates either by taking the latter as a theoretical datum or by defining each point on a growth path as one of long-period equilibrium in the sense of Wicksell. In a constant returns world, the determination of market prices runs in terms of short-run supply and demand, as quantities or functions depending on perspective, while natural prices, alternatively, depend upon prevailing technology, technique and the stock (or its steady state growth rate) of capital. The growth framework is artifically constrained, ironically, to comparative long-run static results. The approach outlined here suggests instead a general interaction between theories of growth and allocation in `classical' thought. Market and natural rates are interdependent because, simply put, they both depend critically on the structure and extent of gross investments.

Third, the Marshallian tradition points to a theory of growth and allocation. (Salter, 1960, 1965) Most of current production is handled by existing `vintages' while adjustments take place at the `margin' of the capital stock. Ex post and ex ante production functions, never exactly coincide. (Harcourt, 1972; 64-65; Kalecki, 1979; 165-166, Kregel, 1980; 120) Long-period equilibrium for Marshall is, in fact, not stationary!

And finally, the orthodox view of Keynes' theory as a strictly short-period theory comes into question. It seems that the Marshallian underpinnings of the **General Theory** are even more pervasive than previously imagined.

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