

# Equilibrium and Determination in Open Systems

## The Case of *The General Theory*

---

Victoria Chick\*

---

In a reply to an article by Sir John Hicks (1980-81) I criticised him (1982), and by implication the whole of mainstream economics, for adhering to what I called a 'maintained method' of modelling by means of systems of simultaneous equations, in which the key concept of equilibrium is perforce defined as market clearing. This makes Keynes's central contribution, the establishment of the possibility of unemployment equilibrium simply incomprehensible. Hicks considered that unless variables were determined in such a way, they were 'indeterminate'; I maintained that the variables in *The General Theory* were determined, though not by market clearing. It did not occur to me for some years that I was using 'determined' in quite a different way from Hicks, and thus talking at cross-purposes with him.

In the light of the continuing confusion over Keynes's contribution in *The General Theory*, it is worth exploring this matter in more detail. I shall argue that one of the lasting contributions of Keynes was to create a concept of equilibrium which is compatible with open-system theorising. This concept is not well understood and deserves an exposition. Indeed, the need for an exposition is greater today than in Keynes's own time, for the 'maintained method' of the mainstream forces a concept of equilibrium which is identified with market clearing.

Market clearing has a powerful hold on our minds. This hold derives partly from the notion of balance between supply and demand, one of the first things one learns in economics. The idea of equilibrium as equality of supply and demand was of course generalised by Walras, whose general equilibrium system counts to some as a form of macroeconomics. The effect is compounded by the mathematisation of the subject and the preponderance of static models, for in a static system of simultaneous equations there is no escape: the solution set gives the only values for which the system is coherent. This is a straightforward mathematical property and, since the system is static, cannot carry implications of a 'state of rest', though in standard practice, dynamic adjustment hypotheses are added to permit a discussion of stability (the 'correspondence principle', Samuelson 1947). In economic terms the solution set is, however, usually described as an 'equilibrium', characterised by coordination of plans. In fact the solution values are the only possible values; thus equilibrium becomes the only possible state.

Teaching *The General Theory* to students makes this point clear. They are not just puzzled as to why I would start a thought-experiment from what they consider 'outer space' - a point on the demand curve for labour but not on the supply curve - they demand an explanation of why we are not at the market clearing point; to them it is the only reasonable place to be. This is revealing of the extent to which the mainstream method has been absorbed, despite its complete lack of economic content.

The solution to a set of equations is not only associated with equilibrium but also with determination of (i.e. locating or finding) actual values. This must be true in a system of static equations, but notice it is not true in the 'stories' we tell. We say, for instance, that when supply does not equal demand, normally the short side of the market 'dominates', that is, determines the actual amount bought or sold. These days, the equations dominate over the

stories and the question of how much is bought or sold in disequilibrium is hardly discussed: the mathematisation of economics is not neutral (Dow 1996).

Mathematisation not only determines what is understood as coherent but also the concept of determination. A model can be 'just determined' or under- or over-determined. If just-determined, the variables are said to be 'determinate', that is, the model is understood to have described not only the variable's value but also its cause. Thus by contrast, the level of employment in Keynes's system is seen, by those wedded to the static mathematical method, as indeterminate.

Where cause is completely explained, we move to a stronger sense of determinacy, the absence of free will. Of course in the context of the non-stochastic, static system, the two meanings are justifiably conflated, for the system is closed, isolated from the larger system from which it has been abstracted. Indeterminacy means either that you cannot find a solution, or that you cannot identify the cause of something, which then is seen as random, capricious. These ideas are tied up with the philosophical equation of certainty and knowing (Vercelli 1991).

But there is a middle ground between determinism and randomness - the area of probabilistic causality. This type of causality is the norm in quantum mechanics but enters economics only via stochastic variables. The systems of equations normally remain closed. Probabilistic causality is fundamental to Keynes's philosophy (Carabelli 1988, Fitzgibbons 1988, Vercelli 1991), as is his instinct to model the economy as a timeful, open system. In all these respects his system differs radically from the closed system of static equations to which it has been reduced. Yet paradoxically, there is an equilibrium in *The General Theory* which looks static, and it is a common perception that *The General Theory* is a retrograde step, static in comparison to the more dynamic *Treatise on Money* (see, e.g., Gilbert 1982). Elsewhere (Chick 1983) I have described the method of *The General Theory* as a static model of a dynamic process.

In Keynes's model there is always an outcome - a determinate outcome in the sense that the 'model' tells us the values of the variables, given expectations. But these values do not require, or imply, market clearing or even equilibrium. Indeed it was Keynes's explicit aim in the *Treatise on Money*, after the famous dissatisfaction with long-run equilibrium expressed in the *Tract on Monetary Reform*, to build a theory which would give results outside of equilibrium as well as in it. And it was his explicit aim in *The General Theory* to construct a theory which could explain persistent unemployment; to have constructed such a theory was his claim to generality (p vii). These achievements were possible because Keynes's *General Theory* system was both open and dynamic. From it, a set of conditions for equilibrium in the time-honoured sense of a state of rest, was extracted.

Equilibrium was a necessary part of Keynes's theory. It was needed in part as an organising device but more importantly as a tool of persuasion: Keynes wanted to establish the persistence of unemployment, the inability of the economic system to return unaided to a position of full employment - to refute the proposition of the self-righting economy.

### The Chapter 3 model

Consider the 'model' of Chapter 3, the simple production model, which ignores most monetary aspects and takes investment as given. In this model, output and employment are determined by the intersection of firms' expectations of aggregate demand and aggregate supply. This is true whether expectations are met or not. If not, the contrast between expectations and the level of actual demand may set in motion an adjustment next period, so the output and employment are not equilibrium levels. Thus it can be seen that determination is separate from equilibrium.

Although the level of output is determined by (aggregate, expected) supply and demand, the model is implicitly dynamic. It is centred around decisions taken in uncertainty about the future, when the goods will be put up for sale in unknown market conditions. In order to produce the goods, however, producers must hire labour; thus money wages are determined at the beginning of the period, by bargaining, conditioned by recent history. Real wages are determined at the end of the period, when the market conditions establish prices; there is no opportunity to recontract, and therefore no opportunity for both workers and producers to meet their objectives. Labour's preferences are met only by accident. If they do not like the outcome, that is too bad; time has moved on and the decision to accept the contract is irrevocable. (The outcome may change the bargaining position in the next period, but that is another matter.)

In neoclassical theory the non-fulfilment of preferences would set adjustment in motion, but this assumes that all parties have the power to make changes which will meet their wishes. This is accomplished by one of several means: either there is recontracting, or the plans of workers and firms are 'coordinated' simultaneously, or only equilibrium is considered. In either of the latter two options, time does not matter; we are back in the world of the static model. Recontracting is also a device for treating historical time as if it had no significance; production is held up, time suspended, until the plans of the 'two sides of industry' are brought into agreement. Production then proceeds in the full knowledge that a market for the output, at prices which allow both profit-maximisation and optimal work-leisure choice, exists. Not so in Keynes; the fact that firms must make labour contracts and production plans in anticipation of the market for the output means that they have a chance of fulfilling their plans (if their expectations prove correct) but labour can do nothing to alter a contract which they might not have entered into in full knowledge.

Even this formulation gives too many hostages to neoclassical economists, for they will then argue that labour will always change their bargain next period. Keynes points out that this is not so: those lucky enough to get a job in a period of unemployment are earning a (real) wage above their transfer earnings and there is no incentive to change the contract. It is only in a condition of full employment when prices turn out to be higher than labour expected, that provides both the incentive to change and the power to do so. The change will take place in the next period - nothing can alter the past - but labour and producers may, in this one case, approach the neoclassical norm. It is also the case that when firms' expectations are not met, they can always do something about it: sack workers, if demand disappoints, or raise wages if they need more labour. It is workers who are disadvantaged, having only the power to withdraw their labour. And it is time, and the fact that they do not own the means of production, which have put them in this position.

Left to decentralised bargaining, workers are in an invidious position in capitalism: except at full employment in a buoyant market, they have no power to effect change. Firms too have their problems: once past the stage of a casual workforce, it is very difficult to reduce wages in a falling market. This problem is less acute in an inflationary environment: it is easier not to let wages rise than to force them to fall.

If sales are as expected, for long enough to be sure that the outcome is not random, there is equilibrium, but this equilibrium is characterised neither by market clearing nor coordination of plans. Fulfilment of firms' expectations alone - with the exception noted above - ensures that the plan executed last period will be repeated in the present. Equilibrium is a point of rest, and what causes the rest is a combination of a lack of desire to change (on the part of firms) with a lack of power to effect change (on the part of workers).

Compare this definition with market clearing, simultaneously a reconciliation of plans and the elimination of unexploited opportunities. For these properties to imply a point of rest requires equal power amongst participants, achieved through either centralised bargaining (of

all things!), or recontracting, or simultaneous reconciliation of plans - arrangements only one of which is technically feasible (and diametrically opposed to the neoclassical ideology). The others are not achievable without a time machine. All are clearly in sharp contrast with the world in which we live.

To put it another way, to bring Keynes's equilibrium into line with market clearing, it would be necessary to reconcile the wage and the price level - but price is determined after the wage. Even if firms get the prices they expect, this is not necessarily the real wage which labour expects/wants. For this reconciliation therefore, labour would have to predict aggregate supply exactly the way firms predict aggregate demand. Yet there is no reason or them to do so: firms need to predict sales, but workers are not in the habit of forecasting the amount of profit firms require in order to be willing to hire them.

Perhaps we ought also to look at how the money wage is determined, for the contrast between Keynes's method and the static method is also revealing here. Keynes says little about the determination of money wages: the two sides of industry bargain (he is careful to say - p. 8 - that collective bargaining is not the cause of involuntary unemployment, pace hundreds of textbooks to the contrary). In the static representation of Keynes's theory they are indeterminate, so the neoclassical interpretation is that they must be taken as given. This is the origin of the 'fixed wage' interpretation of Keynes. But in Keynes's model there is history, and rules for when wages can rise. Starting from yesterday's wage, the wage will rise if firms want more labour than yesterday and there was full employment. Otherwise, they will be stable. (There was no general expectation of inflation when Keynes was writing; the recent history of prices showed a decline.) The money wage is not random or capricious, although principles of bargaining are not specified.

### Changes in investment

Up to now we have just considered the simplest position, where long-run expectations are given, and the 'problem', if there is one, is to adjust short-period expectations to match the level of aggregate demand. It will be helpful, in understanding the open-ended quality of Keynes's system, to see what happens when long-run expectations change. This is the world of changes in investment and the subsequent multiplier. For convenience we start at an equilibrium, though there is no suggestion that this is the background of change in the real world. The level of investment rises. The story is well known: the rise in investment raises income, and increased expenditure on consumption is induced thereby, with producers adjusting their production, more or less imperfectly, to meet the increased demand. The multiplier can be imagined as a sequence, a mechanism of adjustment from one equilibrium to another. The important point for present purposes is that at each stage of that sequence, the levels of output and employment are determined, yet equilibrium is only the end-point of the process. Once again it is demonstrated that determination and equilibrium are separate in Keynes's analysis.

The Chapter 3 model and the multiplier model can both be viewed as static, yet they make no real sense except against a background in which agents know that demand may change at any time and themselves may change their view of it: "A monetary economy...is essentially one in which changing views about the future are capable of influencing the quantity of employment and not merely its direction" (*General Theory* p. vii). Taking expectations as given or postulating a specific, once-for-all change is simply a method of tying down the inherent volatility of these factors to get a (dare I say it) determinate result against a background of indeterminacy in the broader sense. This is sensible, practical model-building, static in formal character but a world away from the static model in which only one level of the variables is possible. There seems little doubt that there are several dynamic processes going on which the static model is capturing. Keynes's system can also accommodate the

'crucial decision' so emphasised by Shackle (e.g. 1968), though Keynes did not put it to that use.

### Conclusion

One could go on to discuss other aspects of *General Theory* models, but it would add little, given present purposes. This comparison of equilibrium in *The General Theory* and neoclassical economics is designed to make two points: when equilibrium is defined as a position of rest and inequalities of power are taken into account, there is no presumption that equilibrium is a market clearing position, yet variables are determined whether there is equilibrium or not. This is only possible in an open, dynamic system. This is not the norm in modern economics (an exception is the model of Carlin and Soskice 1990, Ch 6), but it is more relevant to the world in which we live than the closed, static system which represents Keynes's theory in the mainstream of economics.

---

\* Department of Economics, University College London, WC1E 6BT, U.K.

### References

- Carabelli, A. M. (1988) *On Keynes's Method*, London: Macmillan.
- Carlin, W. J. and D. Soskice (1990) *Macroeconomics and the Wage Bargain*, Oxford: Oxford University Press.
- Chick, V. (1982) 'Comment on "ISLM - An Explanation"' (by Sir John Hicks), *Journal of Post Keynesian Economics* 4, Spring, 439-44.
- Chick, V. (1983) *Macroeconomics After Keynes: A Reconsideration of the General Theory*, Cambridge, MA: MIT Press.
- Dow, S. C. (1996) 'Keynes, the Post Keynesians and Methodology', paper delivered to the Royal Economic Society Conference, Swansea, 1-4 April 1996.
- Fitzgibbons, A. (1988) *Keynes's Vision*, Oxford: Oxford University Press.
- Gilbert, J. C. (1982) *Keynes's Impact on Monetary Economics*, London: Butterworth.
- Hicks, J. R. (1980-81) 'ISLM - An Explanation', *Journal of Post Keynesian Economics* 3, Winter, 291-307.
- Keynes, J.M. (1971-1980). *The Collected Writings of John Maynard Keynes* (ed. D. E. Moggridge and Austin Robinson). 30 vols. London: Macmillan. References below to CW and volume number. Dates of original publication are given in text; page references to *The General Theory* are to the original.
- (1923). *A Tract on Monetary Reform*. CW Vol. IV.
- (1930). *A Treatise on Money*. CW Vols V and VI.
- (1936). *The General Theory of Employment, Interest and Money*. CW Vol. VII.
- Samuelson, P. A. (1947) *The Foundations of Economic Analysis*, Cambridge, Mass: Harvard University Press.
- Shackle, G. L. S. (1961) *Decision, Order and Time*, Cambridge: Cambridge University Press.
- Vercelli, A. (1991) *Methodological Foundations of Macroeconomics: Keynes and Lucas*, Cambridge: Cambridge University Press.