Five Propositions of *The General Theory*

EQUILIBRIUM

Employment is in continuous 'daily' equilibrium corresponding to the point of effective demand, although equilibrium does not mean that all available labour and capital-goods are employed and factor markets clear, nor that expectations are fulfilled.

COMPETITION

Competition in supply and demand is the motive force which holds the system in equilibrium. Agents take prices in each market to be independent of their own actions. The degree of competition is not the same as the degree of monopoly.

MONEY

Equilibrium reflects decisions to incur money-expense by employers, investors and consumers, and not the optimal allocation of factors of production. Money is an integral part of the theory of value and employment, and not a veil. The factor cost-unit is not an equilibrium value.

EXPECTATION

Decisions to produce, consume and invest are based on expectation. Effective demand corresponds to the state of expectation at any time. The long and short term are not the same as the long and short equilibrium periods. The future is unknown, and long-term expectations are fundamentally uncertain.

LIQUIDITY

Liquidity means more than convertibility and includes invariance of value to changes in the state of expectation. Assets possess this property in different degrees, so that money is more liquid than bonds, and both are more liquid than capital-goods.

Prologue

Much of the discussion of *The General Theory* has been at cross-purposes. The purpose of this preliminary chapter is to set out a view of the tacit assumptions, definitions and axioms of *The General Theory*, summarised in the preceding Five Propositions. The aim is to help the reader to be clear about what is (and what is not) being proposed, both in this book and by Keynes, so as to reduce the risk of sterile controversy. The subject of this Prologue is, accordingly, the things on which Keynes was either silent or cryptic, I think because of an implicit framework, which he inherited from Alfred Marshall and believed would be shared by his readers, perhaps wrongly as it turned out. The central chapters will then deal with his explicit statements within the context of the understanding developed in this Prologue.

An immediate illustration of the problem of mutual incomprehension is in the names given to different schools of thought. This text follows Keynes in using the term 'Classical' to denote what is now usually called the neo-classical orthodoxy, which may be described as the theory of value given the full employment of scarce resources, and which it was Keynes's primary object to challenge. Keynes by contrast used the term 'neo-classical' in a more limited sense, to denote specifically the strand of Classical thought which ascribed unemployment to monetary disequilibrium (*G.T.* 177, 183). Keynes's use of the term 'Classical' does not, from the perspective of modern heterodox economics, do justice to the strands of thought in Adam Smith and Ricardo that gave priority over supply and demand to the distribution of income in the formation of prices, let alone to the incorporation by Karl Marx and others into economic theory of social forces other than competition. From this point of view, Keynes was very neo-classical in the modern sense, and his analysis differs substantially from much Post Keynesian thought. At the other end of the spectrum, 'New Keynesian' theory is here treated as an analysis, within the Classical tradition, of disequilibrium defined in relation to a long-period equilibrium in which all scarce resources are allocated optimally and therefore fully employed. 'Old Keynesian' here means the income-expenditure interpretation of *The General Theory* known as the 'neo-classical synthesis' which dominated the discipline from the late 1940s

until the mid 1970s, rather than pertaining to Keynes. So, even this simple attempt to classify the various schools of thought illustrates immediately the scope for confusion and the need for clarity and precision in the use of terms and concepts.

The following sections move through five key concepts of economic theory (equilibrium, competition, money, expectation and liquidity) and articulate the particular forms in which they are to some extent expressed, but for the most part implicit, in *The General Theory*. Each concept is open to a wide range of differing interpretations, so that any given statement by Keynes can make either perfect sense or nonsense, depending on the conceptual apparatus with which it is received. In accordance with the methodological hypothesis of this book, the interpretations put forward here are those which reduce the number of inexplicable statements in *The General Theory* to zero, or at least, to a very small handful.[1]

P.1 EQUILIBRIUM

There are several definitions of equilibrium in economics, including:[2]

1. a state of balance between countervailing forces or processes, notably supply and demand (usually interpreted as market clearing)
2. a state in which no party has both reason and power to change their position (a state of rest)
3. a state in which all parties make their preferred choices (implying that factor markets clear)
4. a state in which expectations are fulfilled.

It is possible for a state to meet all four criteria of equilibrium, but confusion arises when two states, meeting different criteria, are both referred to as states of equilibrium. This confusion is compounded when time and disequilibrium, being a departure from one or other criterion of equilibrium, are added to the mix.

Classical economists since Adam Smith have considered the concept of equilibrium between supply and demand central to economic theory; Keynes was no exception, and in this respect he differs from many of his Post Keynesian and other heterodox followers. For Walras, all four criteria are congruent; for Marshall, only the first three; and for Keynes, only the first two. Equilibrium theorists since Keynes have largely dropped the first criterion, to the detriment, I suggest, of the correspondence between theory

and observation, and concentrated on one or more of the others: Old Keynesian and Post Keynesian economics on the fourth, modern Walrasian general equilibrium theory on the third, and game theory on the second. The core of *The General Theory* must be understood as an equilibrium theory in the 'mechanical' sense of the first two criteria and in the tradition of Marshall, although Keynes's detailed use of equilibrium analysis is highly original, quite unique and does not include the clearing of factor markets.

▶ **AP.1.1**

In the natural sciences, a state of equilibrium corresponds to our first criterion and means that the forces at work in a given situation offset each other, so as to induce no change in the observable state of their object. Simple examples include the archetypal balance in physics, osmosis in biology, and carbonated water under pressure in chemistry. In mechanics, equilibrium is furthermore a property of a body at rest (our second criterion), while dynamic analysis relates to a body in motion rather than in equilibrium, so that time as well as space is part of the equation. A state or position of equilibrium may be stable (egg standing on big end), unstable (egg standing on little end) or neutral (round ball on smooth table). Dynamic equilibrium, common in chemistry and biology, represents a steady state, where two or more dynamic processes offset each other (e.g. reversible chemical reactions, birth and death rates), and may refer to a steady rate of change, as well as to a static level.

Disequilibrium means a departure from equilibrium and is therefore always temporary, if that equilibrium is stable or the disequilibrium leads to a different equilibrium. Disequilibrium can be permanent only in the sense of periodic oscillation about a state of equilibrium, otherwise the new state is simply a trajectory produced by the loss of balance between the forces, and reference to equilibrium is no longer relevant. Disequilibrium always involves dynamics, a process through time. Disequilibrium is something quite different from a change in equilibrium, which results after a change in circumstances creates a new position of equilibrium. If someone grasps a stationary pendulum half-way along the string and pulls it to one side, the pendulum will soon find a new position of equilibrium. If the pendulum is then released, it enters a state of disequilibrium, until its oscillations die down over a period of time and it takes up the position of equilibrium normal for a pendulum free of interference.

Comparative statics is the comparison of different positions of static equilibrium, and comparative dynamics can be defined accordingly, in relation to different steady states. The path of an object towards equilibrium, either from a position of disequilibrium or from a previous position of equilibrium, both involve dynamic considerations. Such a convergence path

or 'traverse' reflects a state of disequilibrium and may itself represent, although not necessarily, a series of positions of equilibrium of a different order at each point of time.

There are four aspects of equilibrium which must be taken into account in translating the concept from physics to economics: (1) the motive force moving variables towards, or keeping them in, an equilibrium position; (2) the observation of equilibrium positions; (3) the period over which equilibrium is established; and (4) the number and type of variables under consideration.

The motive force behind the economic equilibrium is competition, which is addressed in its own right in the next section. With regard to the second aspect, in mechanics, equilibrium is something which can be observed. However, in economics the relationship between equilibrium and disequilibrium has always been uneasy, since the earliest discussions of the trade cycle. The question is whether the observable measures of economic activity such as prices and quantities represent equilibrium or disequilibrium values. Keynes and Lucas (1981), I suggest, implicitly agree in insisting that equilibrium must in principle be observable and conversely that observable values must in practice be treated as equilibrium values, whether static or dynamic, if equilibrium theory is to be fruitful (although they would disagree on the meaning of equilibrium). If observable values are only ever disequilibrium values, equilibrium becomes something of a Platonic Idea with connotations of perfection and unattainability. The Idea of Equilibrium necessarily remains dominant even in the analysis of disequilibrium, since it is the benchmark against which disequilibrium is defined, and towards which the system is assumed to tend at any given instant.[3] If the equilibrium position is never in fact attained, or if ever attained, is not observable, the scientific value of equilibrium theory and its policy prescriptions is doubtful.[4]

The third aspect of equilibrium is the period of time over which any disequilibrium process converges to the equilibrium position. Again since Adam Smith, the distinction has been made between what Marshall called the market, short and long 'periods'. These periods correspond to what is taken as given or exogenous in the analysis of a particular problem, and have a major bearing on the relationship between equilibrium and disequilibrium. The periods are analytical devices for taming the many variables of a complex system, releasing one wandering beast at a time from Marshall's 'pound of *cæteris paribus*'. Market-period prices, which are the only prices observable at any time, are treated by Marshall and Keynes as equilibrium prices; both abstract entirely from market-period disequilibrium. A position of temporary equilibrium (where the supply of finished goods is given,

during the market period) may be one of short-period disequilibrium. A position of short-period equilibrium (where the employment of labour and existing capital-goods by each firm can be adjusted so as to maximise expected profits, but the aggregate stock of producible capital-goods is given) may be one of long-period disequilibrium. The position of long-period equilibrium (in which the aggregate stock of producible capital-goods has been adjusted to its optimal position by the production of new capital-goods or the consumption of existing capital-goods) may itself move over the secular period, as the availability of non-producible factor services (labour and land) changes with population growth and new settlements. These different uses of equilibrium and disequilibrium, to describe the same current state of affairs from the perspective of different periods of reference, are serious traps for the novice or the unwary.

There are major difficulties with Marshall's treatment of time and his theoretical distinction between periods, which Keynes refers to in his biography of Marshall (*C.W.* X) as unfinished business and takes pains to address in *The General Theory*. The principal difficulty resolved by Keynes is how the equilibrium periods should relate to real or calendar time. In *The General Theory*, both the market and short periods correspond to the same period of calendar time, the 'day'. Whereas Marshall distinguishes between them in terms of the length of time ('several months or a year') over which production and employment can adjust so that market prices become equal to normal short-period supply prices, for Keynes the difference between the market and the short periods is that between realised and expected prices; between income and effective demand.

The production and employment decision involves two separate units of calendar time, which Keynes defines as the *day* and the *period of production*, which is a number of *days*. The day is Keynes's quantum unit of time, 'the shortest interval after which the firm is free to revise its decision as to how much employment to offer. It is, so to speak, the minimum effective unit of economic time' (*G.T.* 47, n1); the primary concern of *The General Theory* is the employment decisions of firms. This definition of a day is also the definition of the technical short period, in which entrepreneurs adjust the aggregate employment of labour associated with a given aggregate capital equipment to maximise their expected profits. The correspondence of the day with the market period again follows from the definition of the day, since it is the maximum interval for which the supply of finished output is limited to the stock on hand or producible on demand. Keynes's day need not correspond to a terrestrial day, but it does no harm to think of it as such, since the hours of over-time working can be, and often are, varied at such short notice. The

period of production is the number of *days* 'notice of changes in the demand for [a product that] have to be given if it is to offer its maximum elasticity of employment' (*G.T.* 287). This definition is the macroeconomic counterpart of the period between starting and finishing an individual production process (*G.T.* 46), or *production period*.[5]

Keynes defines the long period in a unique and strictly *short-term* technical sense, to define the equilibrium on which the employment of labour and capital-goods will in theory converge if a new state of expectation persists for the full length of the period of production, allowing in particular for the production or depletion of raw materials and work-in-progress in line with the new pattern of production. This is very different from Marshall's concept of the long period ('of several years'), during which capital-goods are accumulated to the point where no new capital-good (and not only the marginal investment on a given day) yields more than the rate of interest, in a stationary state (or at least in a steady state of growth in line with secular growth in population and territory).

It is perhaps helpful to follow Joan Robinson in thinking of the terms market-period, short-period and long-period mainly as adjectives rather than substantives (Harcourt, 1995). That is not to deny the importance of their connection with intervals of calendar time. Each equilibrium period refers to a different type of adjustment: the market period mainly to market clearing, and income; the short period to the employment of labour and the other factors of production (including existing capital-goods), and effective demand; the long period to the employment of new capital goods, and the capital stock. Thus we need to distinguish the nature of the adjustment from the interval of time in which it takes place, as well as from the time horizon of the relevant expectations which prompt adjustment. The market-period adjustment of the demand for and supply of current output and existing stocks takes place 'instantaneously', on a single day, cleared by spot market prices – this is fairly standard. The short-period adjustment of employment also takes place on a single day but refers to short-term expectations of income that will arise at the end of the various production periods for different goods. The long-period adjustment of the capital stock takes place as a dynamic process over the period of production, and is contingent upon a given state of long-term expectation. Much of this book will be occupied with developing these central ideas in greater detail.

The fourth important aspect of equilibrium is the distinction between partial and general equilibrium. On the first criterion (of a state of balance) this should correspond simply to the analysis of the equilibrium position, on the one hand of one variable or part of a system in isolation, and on the other

of a system of variables as a whole. However, the term 'general equilibrium' has come to mean equilibrium in the third sense (of a state in which all parties make their preferred choice), even when this does not correspond to equilibrium in the first two senses (including a state from which no party has both reason and power to change), as employed by Keynes. It is possible for each part of the system, and thus the system as a whole, to be in a state of competitive equilibrium even though not everyone is in their preferred position: entrepreneurs may have no reason to change their employment decisions and labour has no power to make them do so. Chapter 1 of this book will argue that the purpose of *The General Theory* is precisely to explain how this can be the case. Since it seems now impossible to reclaim the term 'general equilibrium' from its Classical usage without increasing confusion, this book will refer to *system* equilibrium as the still more general case, encompassing both Walrasian general equilibrium and Keynes's equilibrium of 'industry as a whole', with or without full employment.[6]

In the light of the above taxonomy, Keynes's *A Treatise on Money* (*C.W.* V–VI) can be seen to address the *disequilibrium* of employment as a deviation from a position of full employment equilibrium, on the 'neo-classical' hypothesis (in Keynes's sense, *G.T.* 177, 183) that it is in disequilibrium that the distinctive nature of a monetary economy becomes manifest. By contrast, *The General Theory* is a theory of employment *equilibrium* which takes seriously the historical nature of time. Classical authors (old and new) see the source of the disequilibrium of the *Treatise* in what would now be called 'real' or 'nominal' shocks to a long-period equilibrium based upon initial conditions including the availability and distribution of factor services, the technology of production, and the preferences of consumers and workers. In *The General Theory*, the level of employment at any time reflects a position of short-period system equilibrium conditional upon not only the standard Marshallian list of parameters but also upon, among other things, the state of psychological response of consumers and owners of wealth to an unknown future. The psychological factors, divided into the valuation of investment opportunities, the propensity to consume, and the preference for liquidity, are in Keynes's equilibrium analysis as exogenous as the Classical parameters. Furthermore, the psychological factors are independent *variables*, insofar as they are liable to sudden and substantial variation in the short term in a manner not shared, or fully determined, by the Classical parameters. Therefore Keynes's system is not 'closed' like the Classical system, in which the level of employment is fully determined by the parameters, some of which (in the Marshallian version) are taken as fixed in the short period and then released as the period

of reference lengthens. Keynes's system is 'open' in the sense that the three key independent variables are not endogenous, that is, not part of the equilibrium theory. Nevertheless, *The General Theory* remains a theory of the level of employment as an equilibrium value.

Keynes is thoroughly empirical in his use of the concept of equilibrium. His primary interest is in the aggregate level of employment, which is observable and usually fairly stable, changing quite gradually from 'day' to 'day'. His theory offers an explanation of the aggregate level of observed employment, not of the more empirically elusive level of full employment, as a position of continuous system equilibrium. *The General Theory* is therefore an explanation of unemployment in terms of under-employment equilibrium, not unemployment disequilibrium, and this proposition will be expanded further in Chapter 1 of this book. For the most part it is a theory of short-period equilibrium, but there is also a detailed discussion (reviewed in Chapter 2) of the dynamic process of convergence, in which a series of positions of short-period equilibrium trace a path towards a position of long-period equilibrium in Keynes's sense. The short and long periods are not merely logical, but are embedded in calendar time, as are the processes by which equilibrium is established. *The General Theory* uses a statical, mechanical conception of equilibrium, in which a single determinate equilibrium level of aggregate employment at any time corresponds to a given state of the independent variables and initial conditions at the same point in time: this book will from this point onwards use the unqualified term 'equilibrium' in that specific mechanical sense unless stated otherwise. This does not prevent Keynes from considering variation in this state over time, in both the short and the long term, by the use of comparative statics, particularly in the application of his theory to questions of policy in *G.T.* Book VI. We shall find that Keynes's conception of equilibrium is considerably at odds with the received interpretation in terms of the fulfilment of expectations over time, and leads to quite different conclusions.

P.2 COMPETITION

In Classical theory and in Keynes, competition in supply and demand is the motive force which holds the economic system in equilibrium. The motto at the beginning of Marshall's *Principles* (1920) reads '*natura non facit saltum'* [nature makes no leaps] and is a direct reference to Darwin's *Origin of Species*.[7] There can be little doubt that Marshall saw competition as a force similar to natural selection and gravity, as certainly did Walras. Marshall

preferred to refer to this social form of natural selection as a symptom of 'deliberateness', the pursuit of legitimate private interests or the considered exercise of liberty in the sense of Adam Smith. It is this purposefulness, or rational self-interest, combined with the assumptions of convex consumer preferences and production possibilities (diminishing marginal utility and returns, in Marshall's terms) that defines the point of equilibrium. The abstraction represented by the assumption of 'perfect' competition ▶ **AP.2.1** takes this purposefulness to its logical conclusion, by abstracting from the market power of individual firms and from the costs of making transactions and obtaining information about market prices. Decisions are reduced to a function of price alone. Firms themselves become Newtonian particles, each the centre of a web of contracts with consumers, investors and factors of production, including the abilities of the organising entrepreneur. ▶ **AP.2.2** Upon this foundation was developed the structure of the Classical economics addressed by *The General Theory*, and it is within this framework that Keynes's theory needs to be placed and understood.

If the mechanical conception of equilibrium (derived from the combination of our first two criteria) is to offer an explanation of prices at any time (a 'theory of value'), then prices must be taken to be in such equilibrium at all times. The market prices of Marshall's system are always equilibrium prices, even if they differ from the Normal prices corresponding to short- and long-period equilibrium. Disequilibrium is important to Marshall only in the sense of a departure from the Normal, and disequilibrium in the market period is given no theoretical significance. As Keynes notes, market-period equilibrium is a condition for output and money-income to possess a definite value (*G.T.* 64). This means that any tendency to diverge from market-period equilibrium is prevented by the countervailing forces of competition, and a change in the conditions of supply or demand leads not to disequilibrium, but to a change in the equilibrium price (market clearing). There are no queues or rationing: the accumulation or depletion of stocks is seen as an equilibrium decision to buy or sell, based on the spot and expected future market prices. The same elasticity conditions that permit an equilibrium position to exist also guarantee its stability and a smooth convergence from one position of equilibrium to another, as when Marshall's basin, containing a number of balls resting against one another, is tilted. As will be discussed in Chapter 3 of this book, Keynes's major contribution in this area is the identification of a marginal propensity to consume less than unity as a condition of the stability of the system as a whole.

Marshall thus approaches the question of the existence and stability of equilibrium from the premise that observed market prices are equilibrium prices (in the mechanical sense of our first two criteria) and that competitive responses to deviations in prices from Normal lead to changes in the supply and demand of quantities towards their Normal values, which represent equilibrium in our third sense, of full employment. By contrast, in the Walrasian auction, only the Normal is considered to be a position of equilibrium (in our third sense), and deviations from the Normal represent positions of simple disequilibrium. Nevertheless, for both Marshall and Walras, unemployment represents disequilibrium in one sense or other, which unimpeded competition must eventually eliminate. Keynes agrees with Marshall that market prices are equilibrium prices, but adds that the system is always in competitive equilibrium in our second sense (that no party has both reason *and* power to change their position, which allows for non-clearing factor markets), so that competition alone cannot eliminate involuntary unemployment.

Keynes's single cryptic reference to 'the degree of competition' (*G.T.* 245) has generally been interpreted as a reference to the degree of monopoly (*C.W.* VII, pp. 410–11). However, the degree of competition and the degree of monopoly are not the same thing. *The General Theory* assumes that the degree of monopoly is zero, so that individuals take prices as given and independent of their own actions: one element of the definition of perfect competition. The degree of competition is considered further below.

Together with its other elements, namely the absence of transaction costs and full information about market prices, perfect competition means that all finished goods, both consumption- and capital-goods, have perfect spot markets. Furthermore, this means there is no difference between new and old capital-goods in terms of convertibility into money, no difference in the degree of monopoly (or monopsony) facing sellers of second-hand goods. The assumption of perfect competition explains a number of important aspects of *The General Theory*, including its abstraction from financial and industrial structure and the distribution of income. ► **AP.2.3** Nowhere is Keynes's method more clear than in his treatment of capital-goods as if they were individually traded on the stock exchange. For the value of a capital-good thus to be independent of its situation in a particular firm or occupation requires the assumption that it can be transferred without cost or delay to whomever expects to make the best use of it. Thus all finished goods, of both types and of all vintages, have equilibrium market prices that can be realised at any time. The assumption of perfect competition has implications for the

interpretation of the meaning of liquidity in *The General Theory*, which on this reading must mean more than convertibility.

So far we have noted that Marshall's and Keynes's system is always in market-period equilibrium, at the intersection of the supply and demand curves. These curves, strictly speaking, are graphical representations of partial derivatives at the point of equilibrium: for market price or quantity actually to change, the curves must shift. The observed prices in each market, being equilibrium prices, depend on each other and on the state of the system as a whole. What the supply and demand curves really show is the stability of the equilibrium, the signs of the relevant partial derivatives, and how the force of perfect competition corrects any infinitesimal divergence from the position of equilibrium. The divergence must be assumed infinitesimal in the sense of *ceteris paribus*, that any changes in price or quantity in a given market are too small to affect other markets or the system parameters. It is this which makes Marshall's partial equilibrium method determinate, legitimate and in fact superior to the Walrasian method in its treatment of time. Yet, without Keynes's modifications, this method can establish only the level of full employment, based on the labour available to firms, and not the actual level of employment. ▶ **AP.2.4**

Marshall's theory moves from the market period to the longer periods through shifts in the market-period supply and demand curves over time. The market-period supply curves in each industry shift, as firms change production in the short period of a few months or a year, and change the aggregate stock of capital-goods in the long period of several years, in response perhaps to an initial change in preferences or else to changes in technology, or in the factor endowment. These changes in supply may in turn provoke further changes in demand in individual markets as market prices change for given preferences, and these changes in turn may affect the supply of factor services. Meanwhile, the owners of producible capital-goods and specialised types of labour earn (positive or negative) quasi-rents, or wage differentials, if market prices and wages are struck above or below the Normal, and it is the competitive response to these quasi-rents which drives the changes in supply (this is also very much the method of *A Treatise on Money)*. In fact, it is not necessary in Marshall's system that short-period or long-period equilibrium are ever reached, since the parameters of the system may change during the process of convergence, and expectations may well be disappointed (consider the pendulum hanging in the mill-race or being swung from side to side arbitrarily, Marshall, 1920, p. 288). The only equilibrium which unequivocally exists for Marshall, and can be observed in time and space, is the temporary market-period equilibrium at any time; Normal prices

exist only in the minds of entrepreneurs. Nevertheless, Marshall assumes that, at least in theory, market prices will converge on equilibrium Normal prices, over periods of time which depend on the speed with which labour can become available for alternative occupations and entrepreneurs can enter or leave industries, and the time it takes to transfer, produce, wear out or scrap capital equipment. In the long period, competition between entrepreneurs brings marginal cost down to average cost, eliminating the excess of quasi-rents on existing capital-goods relative to those obtainable by new replacements, and competition between workers, in moving between different labour markets or acquiring scarce skills, eliminates temporary wage differentials.

Marshall's long period may be several years, because of the time needed to build new capital-goods (tangible and intangible) and for workers to change their occupations or skills, a period during which much change in parameters is possible and the target may move. Even with a given endowment, technology and preferences, long-period equilibrium may never be reached, if there are obstacles to the free movement of labour and capital-goods into or out of particular occupations and markets, such as 'closed shops' of either workers or entrepreneurs, or other social and institutional barriers to entry and exit. These obstacles may permanently prevent the erosion of market-period and short-period quasi-rents, and it is to these obstacles that the 'degree of competition' refers. ▶ **AP.2.5**

The microfoundations of *The General Theory* are laid squarely upon those of Marshall, and it was not in this respect that Keynes differentiated himself from the Classical school. He uses and develops Marshall's method to determine the level of aggregate employment at any time as a result of individual optimisation by price-taking agents, given the exogenous variables and parameters of the system as a whole. He achieves this by correcting the link between the equilibrium periods and units of calendar time, radically reducing the calendar length of the short and long periods, and by introducing the additional concepts needed to deal properly with time, including user cost and the three independent psychological variables. Perfect competition (meaning, of course, *flexible* prices) remains the motive force behind the equilibrium analysis of *The General Theory*, and it is important to remember, particularly in this respect, Keynes's claim in his preface (*G.T.* xxxi) that his book would be regarded as in essentially the Classical tradition. Nevertheless that tradition includes the approaches of both Marshall and Walras, who treat time and stability very differently: Keynes is firmly in the Marshallian camp.[8]

P.3 MONEY

If *The General Theory* is a theory of equilibrium under perfect competition, how and why does it differ from Classical theory in its treatment of money? In Classical theory, only relative prices matter in the allocation of resources and money is neutral in real terms (the 'Classical dichotomy'). Why does *The General Theory* not lead to the same conclusion, if it shares with Classical theory the concepts of equilibrium and competition?

   The current orthodoxy is that Classical theory describes the long-run equilibrium, which would be reached immediately if prices were perfectly flexible and agents fully competitive, while Keynesian or 'business cycle' theory describes the short run, since prices are in practice sticky. The stickiness of prices reflects both nominal and real rigidities, the latter including obstacles to competition, slow adjustment of expectations, and in more recent theory, asymmetric information.[9]

   We shall see in Chapter 1 of this book that Keynes's principle of effective demand also assumes competitive, flexible prices in goods and asset markets: only relative prices matter in the determination of employment; the problem (as Leijonhufvud pointed out in 1968) is that they are 'wrong', in the sense of our third criterion of equilibrium (preferred allocation). On the other hand, and this is the hardest thing for a Classical economist to swallow, factor prices are not market-clearing values: they are outside the equilibrium model, exogenous. The principle of effective demand can be (and is) worked out using wage-units (*G.T.* 41) as the unit of account: the employment of labour is determined completely independently of the price of labour. ► **AP.3.1** Keynes devotes most of *G.T.* Chapter 2 to refuting on entirely Classical grounds the idea that involuntary unemployment (of labour, although the argument applies equally to other factor services) is the result of a failure to allow money-wages (factor prices) to clear the market. Keynes's notion of system equilibrium does not include the clearing of factor markets; if it did, *The General Theory* would no longer be a theory of a monetary economy. The link between money and factor markets is explored further in Section 1.1 of Chapter 1 below.

   The inconsistency is not in Keynes, but in Classical theory. The basic tenet of Classical theory is that money is neutral; yet how are markets to clear except through changes in money-prices? Relative prices (so-called 'real prices') are ratios of prices in more than one market, and there is no guarantee that a change in one price will leave prices in other markets unchanged (the stability problem explored initially by Hicks, 1939, and later by Arrow and Hahn, 1971). As Keynes points out (*G.T.* 12), the traditional

solution is to introduce a *deus ex machina*, the quantity theory of money and prices. If the price-level is fixed by the quantity of money, changes in factor prices mean changes in their relative prices: yet the quantity theory assumes full (or fixed) employment. This is a circular argument that leaves no room for demand-deficient unemployment.

Keynes had no difficulty with the Classical quantity *equation* as a descriptive relation broadly applicable to the very long term (*G.T.* 306–9). The understanding of causation behind the quantity *theory* is an entirely different matter. His major concern was that the quantity theory of the general price-level, or the value of money, was 'on the other side of the moon' from the theory of value (or relative prices) as determined by supply and demand. In other words, Classical theory does not take supply and demand seriously enough. Far from neglecting money (as did Old Keynesian economics), *The General Theory* integrates it into the theory of value and employment. The relationship between the price-level and the quantity of money is found to be not one of bilateral uni-directional causation, but the resultant of a complex equilibrium system. ▶ **AP.3.2**

The perception of sticky factor prices (there is nothing in *The General Theory* to suggest sticky goods or asset prices) reflects their exogeneity from Keynes's equilibrium model. Exogenous wages are not rigid or sticky wages; on this point Keynes is quite explicit, both in *G.T.* Chapter 2 and the *whole* of *G.T.* Chapter 19. Yet, in a monetary economy, there has to be an anchor for the price-level if the price system is not to break down. Since the quantity theory assumes away the problem of involuntary unemployment, it cannot be invoked to explain the price-level. In a competitive economy, entrepreneurs set their prices in relation to factor cost, so that the price level and the 'cost-unit' (*G.T.* 302) move together. The cost-unit is Keynes's anchor, one of his independent variables, and while it is possible to make certain generalisations about the relationships between his independent variables and between them and employment (*G.T.* Book V is devoted to this), they are not endogenous equilibrium values, and this is what the Classical mind finds so hard to accept. Exogeneity means, not that the cost-unit is unaffected by the balance of supply and demand, but that if it is so affected, it moves from where it happens already to be as a result of past events, not from one position of equilibrium to another. There need be nothing preventing the adjustment of factor prices (especially the relative prices of heterogeneous labour and capital-goods), but such adjustment will not bring about the aggregate clearing of factor markets, which, in the Classical theory, would require changes in the 'aggregate' relative price. If factor prices responded solely to excess supply, they would fall to zero in circumstances of involuntary

unemployment (technically, the factors of production would be free goods). Factor price stickiness is a condition of the stability of the market system, not of the existence of involuntary unemployment: however fast money-wages fall, such a fall cannot (directly) alter the relative prices that govern the level of employment in accordance with the principle of effective demand. Factor prices are in a quite different case from the prices of goods and debts, which are determined in *The General Theory* as equilibrium (market-clearing) values in the market period, by decisions to incur money-expense or to hold wealth in one form rather than another.

The principal form of real rigidity attributed to *The General Theory* is 'elasticity pessimism', meaning the claims that investment is inelastic with respect to changes in interest rates, and that interest rates are inelastic with respect to changes in the quantity of money. This may be supplemented by the absence of the 'real balance' effect, which may be described as an elasticity of consumption with respect to changes in the quantity of money expressed in wage-units, and which does not appear in *The General Theory*, for good reason as we shall see in Chapters 3, 4 and 5 of this book. Inelasticity is not the same as price stickiness, since markets may clear even if supply or demand is inelastic. Elasticity pessimism represents the '*ad hoc* critique' that *The General Theory* depends on behavioural assumptions which are inconsistent with rational long-term individual behaviour (this is considered in depth in Chapter 4 of this book). This can be understood as a rejection of Keynes's deliberate isolation of the three psychological independent variables from the closed loop of the Classical system, in order to leave them undetermined by the system parameters of technology and preferences, and to take them outside the realm of equilibrium theory (as with factor prices). The *ad hoc* critique neglects Keynes's reasons for adopting this open-ended model, which relate to his conceptions of expectation and liquidity, flowing from his recognition of the historical nature of time. The clarification of these reasons, which are of the utmost importance, is the major analytical task of this book.

P.4 EXPECTATION

Our first three propositions support Keynes's claim (*G.T.* xxxi) that *The General Theory* is an extension of the study of the competitive equilibrium of supply and demand in the Classical tradition so as to integrate money into the theory of value. His extension of Marshallian analysis falls into two main areas, the modelling of system as well as partial equilibrium, and the

understanding and treatment of time. Keynes takes time seriously, as a one-way, irreversible sequence of historical events, and recognises that decisions are always made in the present, based on the unchangeable past and the unknown future. It is time which gives money its 'essential and peculiar' character, and makes a monetary economy

> … one in which changing views about the future are capable of influencing the quantity of employment and not merely its direction. But our method of analysing the economic behaviour of the present under the influence of changing ideas about the future is one which depends on the interaction of demand and supply, and is in this way linked up with our fundamental theory of value. We are thus led to a more general theory, which includes the Classical theory with which we are familiar, as a special case. (*G.T.* xxii)

The understanding of time as irreversible has profound implications for equilibrium analysis. If today's decision to produce, consume or invest is to be described as an equilibrium outcome, the competitive forces bringing about this equilibrium must also act today, in the present. Past decisions and future outcomes are strictly irrelevant. For Marshall, the present corresponds to the market period, during which a given stock of finished goods and endowment of factor services are traded, and the supply and demand for the product of each industry are held in equilibrium by competition. The clearing of the markets for factor services in Marshall assumes that any offer of services at the market price will be accepted, but at this point nothing has been introduced to suggest this will not occur under perfect competition.

However, most production takes time. The decision to employ labour or invest in a capital-good today depends on the market prices that are expected to rule in the future (the 'expectations'), when the final output resulting from these decisions is finished and ready for sale. The Walrasian response to time is to postulate the existence of all necessary futures markets, so that the forward price of future finished output *at any date* can be determined today by the balance of supply and demand. This can be extended further to include contingent markets, so that the price implications of any future event, in any state of the world, can be fixed today. Under these strong conditions the future is reduced to the present, time disappears, and equilibrium remains a meaningful, if ideal, concept. Nevertheless, the forward market is an important concept that will prove helpful in understanding Keynes's thinking.

No-one disputes that not all futures and insurance markets exist, so the real question is whether competitive equilibrium theory can explain any important aspect of the world as we find it.[10] In the absence of a forward contract, decisions must be made on the strength of an expectation,

something which already plays an important part in Marshall's system. ► **AP.4.1** Marshall's market prices are qualitatively different from his Normal prices, the expectation of which in the short period induces firms to produce goods in a particular quantity, and in the long period induces investors to order new capital equipment. Marshall does not suggest that Normal prices as such are directly observable, but he does assume that competition tends to bring market prices into line with Normal prices in both the short and long periods, and conflates this process of convergence through time with the determination of Normal prices as equilibrium prices. Keynes accepts for theoretical purposes that market prices tend to converge towards Normal prices; but he changes the definition of the equilibrium periods in terms of calendar time, as well as the concept of a stationary or steady state that is necessary for this process of convergence also to generate Normal values as equilibrium prices. While Marshall's stationary or steady state refers to a physical allocation of resources, Keynes will allow only a given state of expectation that is independent of the physical parameters.

Keynes makes a subtle, but important, addition to Marshall's classification scheme by distinguishing between short-term expectation, which governs the level of production and employment, and long-term expectation, which governs the investment decision. Chapters 1 and 2 of this book will show how the state of short-term expectation can be represented numerically by the set of expected prices, or expectations, upon which production decisions are based. The corresponding representation of the state of long-term expectation is the combination of the schedules of the marginal efficiency of capital and of liquidity-preference, to be explored in detail in Chapter 4 of this book. The state of short-term expectation turns out to depend upon the state of long-term expectation, and it is often convenient to follow Keynes in referring simply to the state of expectation as a whole.[11] This use of the long and short term does not correspond to the technical long and short period, indeed Keynes's long period corresponds to his short term.[12] Periods are determined by the time postulated for competition to bring about equilibrium, and although they may be related to calendar time, in practice or by definition, this need not be so. Long and short term are also in one sense logical categories, relating to the time horizon over which expectations are formed, and in *The General Theory* to the perspectives respectively of the investor and the producer. However, as discussed earlier, both 'period' and 'term' are in *The General Theory* also connected with units of calendar time, the 'day' and the 'period of production', which are determined objectively by the social and physical conditions of production. Indeed, the need to link the

periods of equilibrium analysis to units of calendar time is a prerequisite of treating observed values as equilibrium values.

Keynes's *long-period* equilibrium is based on *short-term* expectation, and relates to a state of expectation which remains unchanged long enough to allow the full adjustment of the aggregate stock of capital-goods and employment to that state of expectation. The horizon of short-term expectation is the period of production, the time required to produce the adjustments to the aggregate stock of capital-goods, and in the output of consumption-goods, to correspond to the long-period equilibrium level of employment. Although Keynes's long-period equilibrium is important for theoretical completeness, it is even less likely to be observed in practice than Marshall's stationary state, since the state of expectation is liable to constant change, even more so than the parameters of the Classical system. Nevertheless, as we shall see in Chapters 1 and 2 of this book, however much it may change from day to day, today's state of expectation determines *in the present* the point of effective demand, and the level of employment, as a position of short-period equilibrium. It is of less practical importance that the state of expectation also defines today a position of long-period equilibrium, on which the short-period equilibrium will converge if today's state of expectation continues unchanged; the limited likelihood of such stability explains Keynes's persistent emphasis on the short period.

Keynes treats the state of short-term expectation as reliable, or at least discoverable by trial and error, given the state of long-term expectation; but the state of long-term expectation itself is an entirely different matter. Keynes does not assume long-term expectations are fulfilled even in his long-period equilibrium (where they are merely unchanged), and indeed considers disappointment more than likely when expectations are not based on the rents of natural resources or monopoly. The period over which competitive equilibrium analysis is of scientific value relates directly to the time horizon within which expectations can reasonably be treated as determinate. The method cannot be applied to the long term, thus wholly undermining the Classical concept of long-period competitive equilibrium, whether static or dynamic.[13]

To assume so-called 'rational expectations' in the long term is heroically to assume a very unheroic world, in which the future can reliably be predicted from knowledge of the present and the past. ▶ **AP.4.2** The state of long-term expectation is as exogenous in *The General Theory* as the endowment and other Classical system parameters, meaning that it is beyond the reach of equilibrium theory. It is a close cousin to the propensity to consume and the preference for liquidity, both of which also reflect the

historical nature of time. In the course of this book, it will become clearer why these three psychological states represent rational (by which I mean reasonable, not optimal in some objective sense) responses by purposeful individuals to the problems of time, in the real world where the Classical long-period equilibrium is logically unattainable, and therefore an objectively optimal response is physically impossible.[14]

P.5 LIQUIDITY

These days, a liquid asset is understood to be one that can readily be exchanged for money, meaning general purchasing power, at a well-defined market price. The claim of this book is that this does not capture the full meaning of liquidity in *The General Theory*, and that Keynes distinguishes between the attributes of convertibility and liquidity. There is more to his conception of liquidity than convertibility. In principle, an asset with low convertibility may have high liquidity, and *vice versa*, however counter-intuitive this may now seem. Liquidity is intimately related with expectation in *The General Theory*, and its meaning is fundamental to the understanding of the book as a whole.

How could Keynes be so perverse in his use of language as to make this interpretation tenable? In the opinion of Sir John Hicks (1972), the financial use of the term 'liquidity' originated with Keynes himself in *A Treatise on Money* and the 1931 Macmillan Report, so that perhaps the fault lies rather with his interpreters. Kaldor notes that

> Mr Keynes, in certain parts of *The General Theory* appears to use the term 'liquidity' in a sense which comes very close to our concept of 'perfect marketability'; ie goods which can be sold at any time for the same price, or nearly the same price, at which they can be bought. Yet it is obvious that this attribute of goods is not the same thing as what Mr Keynes really wants to mean by 'liquidity'. Certain gilt-edged securities can be bought on the Stock Exchange at a price which is only a small fraction higher than the price at which they can be sold; on this definition therefore they would have to be regarded as highly liquid assets. In fact it is very difficult to find satisfactory definition of what constitutes 'liquidity' – a difficulty, I think, which is inherent in the concept itself. (Kaldor, 1939, p. 4, n5)

The paradox of *The General Theory* is that Keynes so emphasises the liquidity of money within a theoretical framework, based on perfect competition, in which *all* assets are equally marketable or convertible. Why does he then discuss *degrees* of liquidity (*G.T.* 226) and, furthermore, suggest

that in certain historic environments *land* has 'ruled the roost' in the hierarchy of liquidity (*G.T.* 241)? If the assumption of perfect competition is to be qualified in practice so that differences in the liquidity of assets are allowed, as a function of their degree of convertibility, this suggestion is startling. Land can never have been preferred for its convertibility, let alone as the medium of exchange. Keynes claims that historically it has possessed high liquidity, despite low convertibility. Conversely, in his discussion of organised investment markets, which come closest in practice to the ideal of perfect competition in terms of transaction costs and uniformity of price, he treats their 'liquidity' (note the inverted commas) as an illusion and something distinct from true liquidity. Listed equity securities have high convertibility, but low liquidity.

Unfortunately, Keynes does not provide a simple definition of liquidity in *The General Theory*, although he comes close towards the end of *G.T.* Chapter 17. In *A Treatise on Money*, Keynes defines (in passing) a liquid asset merely as one that is 'more certainly realisable at short notice without loss' (*C.W.* VI, p. 59). The understanding of liquidity put forward here, as Keynes's implicit definition in *The General Theory*, places the emphasis on the words 'more certainly' in the *Treatise* definition, as the degree to which the value of an asset, measured in any given standard, is independent of changes in the state of expectation.

Liquidity risk is therefore the possible (*not* probable or expected) loss of value as a result of a change in the state of expectation, which includes the state of confidence. In *The General Theory*, there is a hierarchy of liquidity risk, in which bonds are superior to capital-goods, and money is superior to bonds (see Chapter 4 of this book). This hierarchy is of crucial importance to Keynes's division between consumption and different types of investment decisions, which later theory has neglected. Keynes's conception of liquidity is intimately bound up with his conceptions of the state of expectation and of the historical nature of time. Liquidity has value only because the future is unknown, and its value increases with our fear of what might happen that we cannot prevent or insure against. In *The General Theory*, money is *the* liquid asset and dominant store of value, as well as the standard of value, and money's liquidity is the foundation of its non-neutrality. ► **AP.5.1**

NOTES

1.   There are some drafting and printing errors in *The General Theory*. The more substantial ones are dealt with in Sections A2.1.4, A5.3.1 and A5.4.1. In addition, the context requires

that on p. 250 (line 10 up) the word 'producing' should appear before 'its', and on p. 291 (line 14) 'greater' should be 'less'. Furthermore, in *C.W.* VII, on p. 286 (line 6) for 'or' read 'of', and on p. 236 (line 19) for 'closely' read 'slowly', as in the first edition. The presentation of aggregate supply and demand on p. 29 is satisfactory from the perspective of this book (contra Moggridge, *C.W.* VII, p. 385).

2. For a recent discussion of the different usages of equilibrium see Backhouse (2004).

3. Consider the phrase 'the long-run equilibrium around which the economy is fluctuating' (Mankiw, 2003, xxv) and the consequent view that the purpose of monetary and fiscal policy is to 'stabilise' the economy, rather than to shift its equilibrium position.

4. By scientific, I mean an explanation of the world that is open to empirical investigation and rigorous in the old sense of being in conformity with inter-subjective observation as well as internally consistent (Weintraub, 2002). For a scientific theory to have explanatory power does not require that it has predictive power (Lawson, 1997, 2003). See also Runde (1998) on the methodology of assessing competing causal explanations.

5. The consensus about Keynes's use of time periods, from which this book departs, is that Keynes's day and production period coincide, and correspond to a Hicksian week (Chick, 1983; Amadeo, 1989), an equation which tacitly assumes a uniform production period for all goods. Daily employment thus differs from the short-period employment equilibrium in which expectations are fulfilled (Casarosa, 1984).

6. The attempt to reconcile *The General Theory* with the third (Walrasian) criterion of equilibrium leads through Clower to Leijhonhufvud (1968), and other alternative models of equilibrium involving quantities (associated with Hicks, Patinkin, Barro and Grossman, and also the French authors Malinvaud, Grandmont, Benassy and Dréze). These models were thought to show promise for a brief period in the 1970s, but were largely swept away by the 'rational expectations' counter-reformation. Kornai (1971) re-defines general equilibrium in terms of information systems, replacing price-competitive concepts of supply and demand with 'pressure' and 'suction' within an institutional context.

7. See Fishburn (2005) for a fascinating discussion of Marshall's use of *natura non facit saltum*.

8. See Ambrosi (2003) on the relationship between the work of Keynes and Pigou.

9. See Mankiw (2003, viii, xxv). The case made for Keynesian business cycle theory by New Keynesians is that it is more realistic (ibid., pp. 11–12), although the harder line New Classical 'real business cycle' theorists would dispute this (ibid., p. 500). On the present reading, in this respect, Keynes is closer to the New Classicals than the New Keynesians.

10. Hahn (1973) argues that competitive equilibrium theory serves a useful purpose partly by showing precisely how and why the economy does not achieve Walrasian equilibrium.

11. Kregel (1976) associates 'short-period expectations' (sic) with particular individual expectations and 'long-period expectations' (sic) with the general state of expectation, rather than with production and investment decisions respectively (*G.T.* 47), leading to a quite different reading.

12. Keynes does sometimes use the substantive 'long period' to mean 'long term' (*G.T.* 93, 110, 279, 306, 318, 340). My argument depends mainly on his definition and discussion of long-period employment and the related dynamics (*G.T.* 48, see Section 2.2), and his consistent use of the adjective 'long-period' in the technical sense of an equilibrium period. The short 'run' lacks the link of the short 'term' to a definite interval of calendar time, the period of production. In Mankiw, the short run and the long run really refer to different models (2003, p. 240), and we are presumably always in the short run and in long-run disequilibrium.

13. Harrod did not accept that our ignorance of the future made long-term equilibrium theory pointless and regarded the absence of dynamic equilibrium from *The General Theory* as a weakness. He envisaged (and subsequently contributed to) the development of a theory 'concerned not merely with what size, but also what rate of growth of certain magnitudes is consistent with the surrounding circumstances. There appears to be no reason why the dynamic principles should not come to be as precisely defined and as rigidly demonstrable as the static principles' (1937, p. 86). This appears to be the basis of Barens and Caspari's rejection of *G.T.* Chapter 17 and of Keynes's treatment of the state of expectation as

exogenous (1997, p. 303, n48). It is also the view ultimately embodied in modern Classical dynamic general equilibrium theory based upon the concept of long-term long-period equilibrium that Keynes fundamentally rejected. Theories of accumulation and technical change are possible but they should not be equilibrium theories.

14. In this book I normally use the term 'rational' in its ordinary language sense of reasonable in relation to the available evidence, rather than meaning optimal in relation to objectively given circumstances. The main exception is as part of the phrase 'rational expectations', which has, for better or worse, become part of our vocabulary in the latter sense. See Dow and Dow (1985), Hoover (1997), Howitt (1997) and Dequech (1999, 2003). Shackle (1974) describes Keynes's concept of equilibrium as 'kaleidic', which should not be interpreted as necessarily unstable. The term 'kaleidic' refers to the possibility of instantaneous change in the compound psychological state that determines employment as an equilibrium value, and does not mean that this state of mind is inherently unstable or irrational.

Appendix to the Prologue

AP.1 EQUILIBRIUM

AP.1.1 Keynes and Marshall

Marshall's commitment to the use of equilibrium analysis is far from uncritical, and he is more conscious of the difference between animate and inanimate material than Walras, who writes:

> Equilibrium in production, like equilibrium in exchange, is an ideal and not a real state. It never happens in the real world … yet equilibrium is the normal state ... towards which things spontaneously tend under a regime of free competition in exchange and production … The law of supply and demand regulates all these exchanges of commodities just as the law of universal gravitation regulates the movements of all celestial bodies. Thus the system of the economic universe reveals itself, at last, in all its grandeur and complexity: a system at once vast and simple, which, for sheer beauty, resembles the astronomic universe. (Walras, 1926, pp. 224, 374)

Although the formal theory of Marshall's *Principles* employs the mechanical notion of equilibrium, he is diffident about the use of the stationary state and emphasises its value as a tool for analysis, rather than as a description of the world. He is attracted to biological notions of dynamic equilibrium, such as the continuous growth and decline of firms, but can capture them only by the static notion of the 'representative firm' (Marshall, 1920, pp. 264, 285). He is certainly conscious of the problem of time and the limitations of the essential *ceteris paribus* condition.[1]

Keynes is at the same time more, and less, ambitious than Marshall. He is less ambitious because he circumscribes the application of equilibrium theory. He confines equilibrium analysis to the short term, and regards the long term as open only to historical generalisation. He also regards variables such as the money-wage and the rate of interest as incapable of reduction to the parameters of the Classical system, as independent of preferences, technology and endowment. He is more ambitious, in his analysis of the

system as a whole, and in defining functional relationships between measurable economic variables to capture aspects of psychology and probability that are intrinsic to the correct treatment of time. He articulates an explicit dynamic analysis of the relation between the short and the long period, but places more emphasis on shifts in equilibrium positions than on convergence to them.

Keynes is largely silent on the role of the political, social and institutional forces given priority by modern heterodox economics. His implicit position is that he regards competitive market forces as the dominant influence on prices and incomes in the short term, within a given social framework embodied in the parameters of his system. He leaves open the questions of what determines the relationship between capital and labour, the preferences of consumers, the progress of technology and the distribution of wealth. Keynes avoids, on one side, the paternalism of Marshall and Pigou towards the improvement of the working classes, and on the other, the revolutionary's condemnation of private property, yet he does not hesitate to offer proposals for radical reform, where practical reason suggests them.

AP.2   COMPETITION

AP.2.1 Perfect competition

Marshall uses the term 'perfect competition' in his *Principles* only once, in the context of labour supply and somewhat disparagingly, and mainly discusses 'free competition' and 'perfect markets' (1920, pp. 448, 284, 270). The primary characteristic of a perfect market is a uniform price *ex works*, and perfect information refers only to knowledge of market prices (1920, p. 278), in those markets that actually exist. Even the term 'price-taking' hardly does justice to Marshall, since he is well aware that prices must be set by firms and not, in general, by an auctioneer. 'Price-following', without a single price-leader, may be nearer the mark, but this would be an unfamiliar usage. Pigou uses, with reference to firms, the term 'simple competition', defined as 'conditions such that each seller produces as much as he can at the ruling market price, and does not restrict his output in the hope of causing that price to rise' (1932, p. 213). In the context of workers he refers to 'perfectly free competition among work-people and labour perfectly mobile' and here also makes a link between the imperfection of competition and the frictional resistances that prevent the instantaneous adjustment of wages to the demand for labour (1933, p. 252).

Joan Robinson (1934) notes that Chamberlin (1933) preceded her in criticising explicitly the use of the term 'perfect competition' (notably by Knight, 1921) to mean a frictionless, risk-free world. Chamberlin coined as an alternative the term 'pure competition', which was noted by Lerner in his definition of the 'degree of monopoly' (1934) and is generally insisted upon by Davidson. Chamberlin associates perfect competition with smooth adjustment and perfect foresight, while pure competition means simply price-taking, the assumption that agents take prices as parametric, that is, independent of their own quantity decisions. He contrasts pure competition with monopolistic competition, regarding Robinson's term 'imperfect competition' as confusing the issue. 'Monopoly ordinarily means control over the supply, and therefore over the price. A sole prerequisite to pure competition is indicated – that no one have any degree of such control' (1933, p. 7). This is an important definition.

Hicks follows Robinson in defining perfect competition as a neglect of 'the influence on supply which may arise from calculations made by sellers about the influence on prices of the sales they make themselves. (Similarly for demand.)' (1939, pp. 6–7). He emphasises that 'a general abandonment of the assumption of perfect competition, a universal adoption of the assumption of monopoly, must have very destructive consequences for [the determinacy of] economic theory' (ibid., p. 83). He then writes

> It is, I believe, only possible to save anything from this wreck – and it must be remembered that the threatened wreckage is that of the greater part of general equilibrium theory – if we can assume that the markets confronting most of the firms with which we shall be dealing do not differ greatly from perfectly competitive markets. (ibid., pp. 83–4)

At the time that Hicks was writing, Keynes also wrote in a similar vein about the empirical evidence against short-period diminishing returns that 'Mr Dunlop, Mr Tarshis and Dr Kalecki have given us much to think about, and have seriously shaken the fundamental assumptions on which the short-period theory of distribution has been based hitherto' (*C.W.* VII, p. 411).

Joan Robinson's aim was to define perfect competition solely in terms of demand, as 'a situation in which a single seller cannot influence price', and to undermine and dismiss the traditional idea of perfect competition as 'a situation in which a single seller cannot make more than normal profits', associated with the free movement of resources (1934, p. 104). Post Keynesians along with all other modern economists have followed Robinson, while Keynes remained on the side of tradition, which proves important when we come to consider the 'degree of competition'. Robinson's complaint was

that the two different notions of perfect competition were 'very closely linked in many minds and lumped together' (ibid.). What we now call price-taking was certainly bound up closely with arguments that competition would allocate resources to their socially optimal use in the absence of frictional resistances:

> the free play of self interest, so far as it is not hampered by ignorance, tends in the absence of costs of movement, so to distribute resources among different uses and places so as to render rates of return everywhere equal … [and where there are costs of movement, so as to] raise the national dividend and, with it, the sum of economic welfare to *a* maximum. (Pigou, 1932, pp. 142–3, original emphasis)

There is much to be said for following Chamberlin in preferring the term 'pure competition' when price-taking alone is meant, except that it is not in common use. Certainly Arrow and Hahn (1971, pp. 16, 33), masters of precision, follow Robinson and Hicks in using the term 'perfect competition' to mean only price-taking and are explicit that it does not automatically mean the assumption of all the futures markets necessary for Knight's perfect foresight.

Sections **AP.2.3** and **AP.2.5** develop the argument that *The General Theory* assumes perfect competition (in the above sense of price-taking) in the markets for current output and for existing capital-goods, with the degree of (imperfection of) competition understood to refer to long-term obstacles to the free movement of resources into and between industries and occupations. Some have interpreted Keynes as assuming (or needing to assume) quite the opposite of perfect competition;[2] nowhere does he state unequivocally what he assumes. Perfect competition (in both Robinson's senses) was the benchmark assumption of Marshallian economics, even after Robinson's and Chamberlin's books were published in 1933, so clearly Keynes might just have taken it for granted that an explicit statement was necessary only when departing from the standard case – he claimed, after all, to be writing essentially in the Classical tradition (*G.T.* xxxi).

Keynes's single reference in *The General Theory* to the term 'perfect competition' contrasts it with imperfect competition in a phrase that echoes Pigou's *Economics of Welfare* (1932):

> Again, if we have dealt otherwise with the problem of thrift, there is no objection to be raised against the modern classical theory as to the degree of consilience between private and public advantage in conditions of perfect and imperfect competition respectively. (*G.T.* 379)

In his post-publication correspondence with Ohlin, he writes 'The reference to imperfect competition is very perplexing. I cannot see how on earth it comes in. Mrs Robinson, I may mention, read my proofs without discovering any connection' (*C.W.* XIV, p. 190); and to Pigou: 'Imperfect competition and associated problems is the only *other* branch of theory which is interesting people at the moment, judging from what reaches me' (*C.W.* XXIX, p. 176, emphasis added). Together these comments provide circumstantial, if not conclusive, evidence that Keynes did not depart from the standard assumption of price-taking as defined here.

The first piece of textual evidence that *The General Theory* assumes price-taking is Keynes's acceptance of the first Classical postulate (that the wage is equal to the marginal product of labour, *G.T.* 17) of which the corollary is that, 'subject only to the same qualifications as in the classical theory', price equals marginal cost so that the degree of monopoly is zero. These 'qualifications' play no part in *The General Theory*, since Keynes's purpose was to demonstrate his point of departure from the Classical system, not to rehearse familiar arguments (see the above quotation from *G.T.* 379).

Further direct evidence is the equation of marginal proceeds with marginal factor cost (*G.T.* 55), definition of short-period supply price as the sum of the marginal factor cost and marginal user cost, or marginal prime cost (*G.T.* 53, 67–8), definition of long-period supply price as long-period average cost, including supplementary, risk and interest costs (*G.T.* 68), and reference to aggregate supply functions as embodying the *physical* conditions of supply (*G.T.* 246, original emphasis). The ambiguity that these references could be construed as equating supply price (in the above competitive sense) to marginal revenue when there is a degree of monopoly, rather than to demand price, is settled conclusively by the statement that: 'In a single industry its particular price-level depends partly on the remuneration of the factors of production which enter into its marginal cost, and partly on the scale of output' (*G.T.* 294). This view is corroborated by the definition of the elasticity of output (*G.T.* 283).

Further indirect textual evidence, in the form of Keynes's abstraction from financial and industrial structure and the distribution of income, is considered in Section **AP.2.3**.

AP.2.2 Keynes's agents

The assumption of price-taking is open to challenge on both theoretical and empirical grounds. Price-taking can be distinguished from atomism, as Chick notes by her use of the term 'polypoly' (1983, p. 25, also used independently

by Kahn, 1989), and atomism is not itself a sufficient condition for price-taking. Yet the legal corporation strongly resembles a Newtonian particle in its lack of spatial dimensions. The distinction between the corporation and its members, officers and servants is of great practical importance, as is the similar distinction made by the tax authorities between persons (both natural or legal) and their trades or businesses. The atomistic conception of the firm is not in this sense unrealistic.

What is open to debate is the degree to which the firm can in practice be treated as having a single mind embodied in the 'entrepreneur', and to which the firm is capable of maximising its market value. Agency and asymmetric information theory, together with all shades of institutionalism and the reality of the human capacity to choose 'to do otherwise', emphasise the extent to which firms are complex social structures whose behaviour cannot be reduced to unitary corporate self-interest or fiduciary duty, constrained merely by competition and technology. Nevertheless, the atomistic conception of the firm does less violence to reality than does the abstraction from the historical nature of time represented by the Walrasian inter-temporal auction.

Some clarification of Keynes's taxonomy of market agents is useful. Individuals derive their income from three sources, as entrepreneurs, rentiers and workers. These categories are not social classes as in Marx or Kalecki, since one person may combine all three roles even if in practice people tend to specialise, by choice or otherwise. Entrepreneurs operate firms, rentiers provide the services of assets including money, and workers provide labour services. Firms are divided into a number of industries that each produce a single homogeneous good, which may be either a consumption-good or a capital-good.

Firms and households are best thought of as domains of activity, of transformation of goods and services into, respectively, other goods and services (production for sale in the market) and into personal utilities (consumption of purchases made in the market). The terms 'production' and 'consumption' must be used carefully, since household consumption involves domestic production, and production by firms involves capital consumption. Keynes adopts the usual abstraction from domestic production for personal use but gives considerable attention to the consumption of capital by firms, which he calls 'user cost'. Keynes does not use the term 'household' and uses 'firm' and 'entrepreneur' interchangeably. There is no separate treatment of legal persons, notably corporations, which he treats as artificial entrepreneurs with no net worth in terms of assets or personal faculties, all such services being bought in, and whose entrepreneurial income flows to rentiers.

The ultimate factors of production are non-producible natural resources ('land'), which command a true rental for their services; hired labour for which the rental is termed a wage; and a stock of existing producible capital-assets (the 'capital equipment') that may earn quasi-rents: taken together, these are the 'resources' whose employment is the matter in question (*G.T.* 4). Money is broadly non-producible and commands interest as its rent through debt contracts. Labour is treated as homogeneous, so that skilled labour is reducible by some function to standard labour.

The recipients of all three categories of income exchange money for consumption-goods. Both entrepreneurs and rentiers also exchange money for physical capital-goods, which, in the context of investment as opposed to production, Keynes tends to call capital-assets. Capital-goods are defined by the property of offering a money yield, either directly through sale or rental, or indirectly through production. He often refers to the stock of capital-goods (sometimes 'stock of capital') as the capital equipment, perhaps to avoid the connotation of homogeneity associated with the concept of capital stock (*G.T.* 38, 186, n1). Although money forms part of an individual entrepreneur's capital equipment, it largely disappears upon aggregation and, whether in the form of debt or commodity, is not producible to any significant extent by labour. There are no consumer durables since these offer no money yield; a consumption-good is defined by its sale to a consumer (*G.T.* 61).

AP.2.3 Capital-goods and capital markets

Keynes's assumption of perfect markets for capital-goods means that the number and size distribution of firms in each industry is endogenous, determined by the existing capital-goods and the degree of competition. If one entrepreneur expects to make more profitable use of any or all the capital-goods of another firm than the second entrepreneur expects to, the first entrepreneur will place a higher value on the assets than the second, and it will be mutually profitable to transfer them in the short period, just as is assumed in the case of the employment of labour. Keynes places great emphasis on the independence of his definitions of income from the degree of integration of industry (*G.T.* 24, n2, 55, 66–7). Keynes is therefore silent on industrial structure (apart from the degree of competition, see Section **AP.2.5**), and in general makes no assumption about the number of firms or the distribution of the capital equipment among them, nor do these appear in his list of given parameters (*G.T.* 245).

The assumption of perfect competition also makes the distribution of income partly endogenous. Keynes takes as a parameter 'the social structure and other forces' (*G.T.* 245) which influence the distribution of the existing capital-goods and human talent, access to particular occupations, etc, as well as transfers by taxation. While these may represent departures from, or obstacles to, some ideal long-period equilibrium of a meritocratic property-owning democracy, Keynes does not consider such questions open to equilibrium analysis, although he does express some preferences (e.g. that 'the euthanasia of the rentier' is to be welcomed). Nevertheless, the assumption of short-period diminishing returns required by perfect competition means that in a comparison of two positions of short-period equilibrium, the higher level of output and employment will be associated with a lower real wage (since the price of consumable goods will be higher relative to the money-wage) and a larger share of income will go to the owners of capital-goods by way of quasi-rents, including to entrepreneurs by way of the difference between average and marginal cost (the latter being in equilibrium equal to the expected price). Keynes later expressed considerable concern about the implications for the Marshallian theory of value of the empirical evidence that real wages were positively, and not inversely, related to output and employment (*C.W.* VII, p. 411).

Keynes's abstraction from corporate financial structure has always troubled the Post Keynesian school (notably Joan Robinson, Davidson (1972) and Minsky (1975), who have placed great emphasis on differences in the marketability or convertibility of capital-assets and their titles).[3] Keynes's discussion of capital-assets throughout *The General Theory* reflects the standard Classical assumption that all assets are held directly by individuals (including workers, in principle) in their capacities as rentiers or entrepreneurs (note the inclusive definition of entrepreneur for this purpose on *G.T.* 46). Shares merely divide the entrepreneurial element of corporate income between rentiers. Rentiers and entrepreneurs alike invest in capital-assets, whose prices are dominated by the expectations of rentiers, who can, if they have the stomach, become entrepreneurs themselves. The investment decision is framed in portfolio terms that apply equally to both entrepreneurs and rentiers, and there is no systematic difference between them in their access to loans of money or to the hire of capital-assets (although there may be differences between individual entrepreneurs in their access to credit, *G.T.* 144–5). The difference between rentiers and entrepreneurs is that rentiers, like workers, receive an income fixed in terms of money for a given level of employment of their services, while entrepreneurial profit depends on future realised results.

Capital-assets are perfectly transferable among entrepreneurs and rentiers and as Pigou puts it 'the free play of self interest, so far as it is not hampered by ignorance, tends in the absence of costs of movement, so to distribute resources among different uses and places so as to render [current] rates of return everywhere equal' (1932, p. 142). Keynes in effect qualifies this only by inserting the word 'expected' before 'rates of return' (*G.T.* 141). In footnote 1, *G.T.* 151, he states explicitly that 'I should now [say] that a high quotation for existing equities involves an increase in the marginal efficiency of the corresponding type of capital.' The rate of interest is the price of parting with money for a period of time, and the marginal efficiency of capital can equally denote the expected profitability of decisions to acquire a stock of newly produced raw material that will be wholly used up in a single production period, to acquire a machine that will wear out over several production periods in a year or two, or to acquire a new building for rental over a period of many years. The nature of the legal contracts, in particular whether an asset is owned by a rentier and hired by an entrepreneur, or owned directly by an entrepreneur (who may or may not have borrowed money to finance the purchase), is not important. The value of an asset is in *The General Theory* a function of its physical efficiency in adding to aggregate income, together with the rate of interest, so that there is no distinction between value in use in production and value in the market, a consequence of the assumption of perfect competition. If individual expectations differ, arbitrage will move an asset to the holder with the highest expectations (as in the reference to the purchase of an existing enterprise at *G.T.* 151).

The discussion of new and old investments in the Appendix to *G.T.* Chapter 14 relates to the distinction between the efficiency of an asset and the rate of interest. The value of an old asset may be greater or less than its original supply price, so as to bring its efficiency into line with the corresponding rate of interest. Any such difference between value and original cost, apart from physical depreciation and changes in the term structure of interest rates, reflects a change in either expectations or liquidity-preference, not a difference of convertibility. For Keynes the essential difference between liquid and fixed capital (where liquid here means finished output or raw materials which can be sold) is solely that the yield of liquid capital consists of a single current term rather than a prospective series; there is no suggestion that it reflects the relative ease with which the value of their prospective yields can be converted to money (*G.T.* 73). Note that the holding period (*G.T.* 225) may be shorter than the economic life of a capital-asset. A divergence of the bid and offer prices at the end of the holding period would

mean the prospective yield from an asset could not be defined independently of the intended holding period. The assumption of perfect competition allows the value of the asset to be defined uniquely in terms of the prospective yield over its economic life, abstracting from the circumstances of particular firms and investors.

AP.2.4 The independence of supply and demand

The determinacy of Marshall's analysis requires the independence of the supply and demand curves, and, on both sides of the market, of price and quantity. This requires two sets of conditions, one relating to individual markets and the other to the system as a whole.

The first (microeconomic) condition can accommodate the case of monopoly (and monopsony, a single buyer), but not oligopoly or imperfect competition, where the bids and offers of individuals depend on those of their competitors. For this reason perfect competition is always associated with atomism, meaning that firms and households are small enough for the quantity they individually supply or demand not to affect the market price. The Marshallian concept of the industry neatly reconciles the horizontal demand curve facing the individual price-taking firm with the downward slope required for a stable equilibrium. Atomism in turn requires a further assumption that individual firms face diminishing returns, so that the output of a firm is limited at any given price, and that individual households experience diminishing marginal utility, so that demand is limited at any given price.

The second (macroeconomic) condition for the determinacy of the Classical system is that the factors of production are fully employed. In the absence of production (during the market period), the aggregate quantity of goods reflected in the supply curve is fixed, so that equilibrium between supply and demand in one market also implies equilibrium in the choice between substitutes. When production is introduced (in the short and long periods), the constraint of a fixed aggregate quantity has to be replaced by another, and in the Classical system this constraint is the endowment of factor services. In particular, the level of aggregate employment is equal to the supply of labour made available by households to firms, and marginal rates of transformation or 'productivity' are added to the analysis in order to link together equilibrium in product and factor markets.

It is in presenting effective demand, rather than the endowment of factor services, as the constraint on aggregate production that Keynes differs from the Classicals. The virtue of Keynes's Marshallian method is that, if the total

level of output is determined by effective demand, the theory of the individual industry and firm remains essentially intact, as Keynes suggests (*G.T.* 31–2). By contrast, no meaning can be given to a system equilibrium with less than full employment in a Walrasian context.

The parameters of endowment, technology and preferences must be fixed, or changing only in a steady manner, if the Classical supply and demand curves are legitimately to be drawn for the short and long periods as well as for the market period (as in Marshall 1920, p. 288, n1). For in Marshall's system, quite rightly, changes in employment and capital equipment take time, for which there is no axis in the market-period diagram (Marshall acknowledges this, 1920, p. 667, n2). The determination of Normal prices as equilibrium prices assumes that any divergence of market prices and quantities from Normal does not itself shift the Normal position of equilibrium. An increase in production, induced by a temporary increase in demand that subsequently abates, which then leads to a market price below Normal, must be reversible so that if production returns to Normal, market price will do so also. This condition can only be met in a stationary or steady state.

When challenged that since 'the economic world is subject to continual changes, and is becoming more complex, … the longer the run the more hopeless the rectification', Marshall concedes that the provisional treatment of 'variables as constants' is the best he can do (1920, p. 315, n1); it seems probable that he would have regarded modern Walrasian inter-temporal general equilibrium theory as achieving greater consistency by an *ignoratio elenchi* – by missing the point, namely the difficulties associated with time.

The 'top down' relation between aggregate effective demand and employment, in aggregate and at the level of the industry and the firm, is defined by Keynes as the 'employment function', which itself is related to the aggregate supply function. Keynes's important but neglected synthesis of the principle of effective demand and the theory of value is considered further in chapters 2 and 5 of this book and their Appendices.

AP.2.5   The degree of competition

In Marshall and Pigou, what Keynes calls 'the degree of competition' (*G.T.* 245) refers to the conditions of supply rather than to the slope of the demand curve faced by an individual firm. Joan Robinson wrote that 'Keynes did not accept the "perfect competition" of the text-books, but some vague old-fashioned notion of competition that he never formulated explicitly' (quoted in Sawyer, 1992; see Marshall, 1923, pp. 396–8). In my view, Keynes's

given degree of competition refers to competition among entrepreneurs and workers, and is a matter of the obstacles to the free movement of resources (both capital-goods and labour) into and between industries and occupations, associated with what he calls 'closed shops' of either employers (*C.W.* XIII, p. 639, n1) or workers, together with the other social and institutional resistances connected with voluntary unemployment (*G.T.* 6). These long-period obstacles are to be distinguished from the temporary frictional delays that may prevent full adjustment in the short period and lead to the Classical form of (frictional) involuntary unemployment, from which Keynes abstracts in defining full employment (*G.T.* 15–16).

The degree of competition is quite different from Lerner's 'degree of monopoly', which measures (in monopolistic equilibrium) the extent to which a firm can influence the demand price for its output by varying its supply offer, and which for a price-taker is zero. A degree of imperfection in competition need not be associated with any degree of monopoly. If competition is less than perfect, in Marshall's sense, price-taking firms may be earning profits above the normal level in the long period because of obstacles to the introduction of additional capital equipment into the industry, but they cannot increase these profits by restricting their own output from a given capital equipment unless they can also act together as a cartel and achieve monopoly (in line with Chamberlin's definition, see Section **AP.2.1** above). Profit-maximisation in the short period with the industry's existing capital equipment means satisfying the first Classical postulate, so that labour receives its marginal product and unemployment cannot result from 'monopolistic practices on the part of employers'. Similarly, unionised workers may be able to restrict entry to a particular occupation and keep wages up accordingly, but a closed shop does not prevent increases in the employment of union labour by an individual firm. The first Classical postulate remains valid, even if trade unions restrict entry to occupations and keep wages in particular trades above the levels associated with the free movement of labour.

A measure of the degree of competition for a firm would be long-period average cost divided by long-period price (defined in Section **AP.2.1**), by contrast with the degree of monopoly defined as the ratio of the excess of short-period price over short-period marginal cost to the price $(p-mc)/p$; the degree of competition may be less than the long-period maximum (100%) even if the degree of monopoly is zero. For workers, a measure of the degree of competition would be the labour actually available to firms, divided by the aggregate labour individual workers are willing to offer at the going wage —

$S_u(\hat{w})/S(\hat{w})$. Whether any of these measures can be observed is another matter.

The General Theory is a development of the Classical tradition of its time to address the economics of the system as a whole. Keynes is clearly aware of the contemporary development of the economics of monopolistic competition by Robinson and Chamberlin, yet regards this development in the same light as the traditional theory of monopoly and monopsony, as relevant only to the analysis of individual markets. Since all such analyses must take the demand curve as given, they can only describe the distortion of price and quantity in a particular market once the level of aggregate employment is given, and necessarily invoke the *ceteris paribus* condition. Keynes's method appears to be to specify the general case for the system as a whole in terms of perfect competition, while leaving the analysis open for theoretical purposes to departures from perfect competition in particular cases at industry and firm level, in accordance with established principles. ▶ **A5.3.4** Keynes's approach is consistent with his principal objective of demonstrating that involuntary unemployment (in his sense) does not reflect obstacles to competition.

AP.3   MONEY

AP.3.1   Unit of account, store of value and means of payment

The General Theory is a theory of the monetary economy. Not only are prices and incomes expressed and determined in terms of money, it has a significance beyond that of a simple counter, numeraire or 'money of account'. Nevertheless, the paramount importance of money (as unit of account and store of value) in the determination of employment must not be confused with the role of money (as means of payment) in the finance of expenditure, even if that former importance ultimately derives from its latter role as means of payment.[4] For the reasons elaborated in Chapter 2 of this book, it is essential to follow Keynes in keeping money payments and money-income at one remove from each other. Apart from the exceptional case of the production of commodity money (e.g. gold-mining), in accounting terms money belongs to the balance sheet and money-income to the income statement: they have entirely different domains. This means, in particular, rejecting the idea that the importance of income is as a source of *finance* for expenditure, notably consumption: the question of finance is entirely secondary and Keynes largely abstracts from it. The concept of the circular

flow of income and expenditure, while valid if understood as a snapshot representation of static equilibrium at a point in time (provided that income and expenditure refer to accruals, not receipts and payments), is highly misleading when used to suggest a sequence of events over time and the circulation of means of payment, as will become clear when we come to discuss Robertson's version of loanable funds theory. ▶ **A2.3.3** The separation of the domains of money and money-income does not, of course, detract from the central role played by money (as a store of value) in the inducement to invest.

AP.3.2 Endogenous money

Part of the Post Keynesian response to the renaissance of the quantity theory has been to emphasise the endogenous nature of money creation by the banking system and the ability of the central bank to control either the quantity of money or the short-term interest rate, but not both. This has led to some tension with Keynes's liquidity-preference theory of interest rates and to a questioning of the generality of Keynes's assumption in *The General Theory* that the quantity of money is an independent variable. Some points of clarification are useful here.[5]

Firstly, Keynes was well aware of the nature of bank money and had written extensively on it in *A Treatise on Money*. At several points in *The General Theory* he describes the creation of money by the banking system, and notes that the quantity of money may be a function of the price-level (*G.T.* 266), although he appears to bend over backwards to accommodate the Classical position by allowing that the quantity of money may be 'virtually fixed'. Secondly, he accepted subsequently the case for making the finance motive an explicit part of the transactions demand for money, and noted the practical importance of overdraft finance in allowing the banking system to meet this demand without an increase in interest rates. Thirdly, the rate of interest in *The General Theory* is to be understood mainly as the interest differential between long-term bonds and short-term bills or deposits.[6]

Long-term bonds are the relevant benchmarks for investment in durable capital-goods with a similar life, such as housing, transport and utilities systems. It is this form of investment that Keynes regards as sensitive to monetary policy and of greater importance for employment than industrial investment (*G.T.* 106, 163–4). A major concern of *The General Theory* is to explain, in terms of liquidity-preference rather than time-preference, why the interest rates on long-term bonds do not fall to zero.

Liquidity-preference remains relevant to the extent that long-term capital-goods have to be financed, directly or indirectly, by individuals, corporations and institutions other than banks. If all capital-goods could be financed entirely by bank loans, the problem of liquidity-preference would not arise. *The General Theory* abstracts from financial structure, but as noted above, the tacit framework is that capital-goods are owned by entrepreneurs and rentiers (whether individual or corporate), funded by accumulated income and by debts both to banks and to other rentiers (i.e. bonds). ▶ **AP.2.2**

Keynes is explicit that, as a rule, he assumes that money is co-extensive with bank deposits but that this is not fundamental (*G.T.* 167, n1). He does not address the determination of the short-term interest rates at which banks lend and accept deposits, although these must be assumed respectively to lie between the bounds set, on the one hand, by bonds or bills of similar maturity to bank loans and, on the other, by the zero rate on currency. The theory of liquidity-preference addresses the differential between the short-term interest rates, if any, on money, so defined, and the complex of rates of interest for non-bank debts of different maturities (*G.T.* 167, n2).

The quantity of money is accordingly a function of the terms on which reserves are made available by the monetary authority, the attitude of the banking system towards reserve ratios (which partly depends on the state of confidence), and the demand for bank loans, which in turn depends on the short-term rates of interest at which banks lend. This composite function may be regarded as the state of banking policy (*G.T.* 327, 378). The quantity of money may be endogenous to the banking system, insofar as the banks may decide the volume of their lending after taking into account the price at which they can borrow reserves from the monetary authority, yet it remains under the control of the banking system (as distinct from the monetary authority), and not of the entrepreneurs who apply for bank loans. The quantity of money remains independent of the employment decisions of entrepreneurs, even if the quantity of money can be altered by the financial decisions of the banking system.

The trade-off for the banking system, between the loss of income from holding idle reserves and paying a penalty rate for borrowed reserves, may partly reflect speculative liquidity-preference in a more specialised sense. The extent to which the monetary authority can control the banking system may vary, especially between the up-swing and the down-swing. Yet the main issue for Keynes is the liquidity-preference of the rentier public in relation to the quantity of money created by the banking system and the interest rates offered by long-term bonds.

AP.4 EXPECTATION

AP.4.1 Expectation and expectations

In Keynes's Marshallian framework, an 'expectation' is usually associated with an expected price, including a rate of return. The expected price is the price which 'if it were held with certainty, would lead to the same behaviour as does the bundle of vague and more various possibilities which actually makes up [the entrepreneur's] state of expectation when he reaches his decision' (*G.T.* 24, n3). A 'state of expectation' can in turn be associated with a set of expected prices.

Keynes's use of the term proceeds rather than price has led some to understand him to extend 'expectations' to quantities, in the sense that firms are assumed to estimate demand curves, whether at the industry or aggregate level. Such a 'price-making' approach would have been quite inconsistent with the Marshallian method, and Keynes certainly gives no explicit indication of having made such a radical departure. Expected prices are sufficient under perfect competition, given the capital equipment and other short-period parameters, to determine the level of employment (and the expected proceeds, to which the above footnote in fact refers), so that short-term expectations can be taken to refer solely to the prices relevant to production decisions. It is true that to work out the prospective yield of a new capital-good requires an expectation not only of price, but of income over the economic life of the asset, but once again, this series of income is in principle determined by future prices, given the future capital equipment, technology, degree of competition and indeed all of Keynes's short-period parameters in each future period, as well as future levels of effective demand based on future states of long-term expectation, liquidity-preference and the propensity to consume (*G.T.* 147). Given all these future conditions, it comes as no surprise that long-term expectations are tentative, and not often in practice arrived at by calculation in this manner. The particular point at issue here is that both future price and future supply and demand conditions are treated as parametric by the individual firm. There is no suggestion that firms take into account the production decisions of other firms or the effect of their own production decision on the future market price.

AP.4.2 Expectation and probability

Keynes's approach to long-term expectation in a world subject to unforeseen change appears to be informed by his distinctive and highly developed

understanding of probability.[7] In *A Treatise on Probability* (*C.W.* VIII) he treats Classical frequentist probability theory as a special case within a branch of philosophical logic that deals with arguments that are doubtful, but neither demonstrably certain nor logically impossible. He understands probability as an argument or logical relation between one set of propositions (the conclusions) and another set (the evidence). Mathematics deals with analytic relations between propositions that must be either true or false. In matters of metaphysics, science and conduct, an argument is considered 'probable' to the extent that it warrants a degree of rational belief. Such a probability relation is objective, in the sense that any rational judge would reach the same conclusion upon the same evidence. Probability is not in general numerical, as in frequentist theory, but arguments can be, and often are, compared. An archetypal case is the verdict reached in a court of law.

Although Keynes treats investors as forming single-valued expectations of prospective yield, these estimates bear a complex relation to the 'bundle of vague and more various possibilities' (*G.T.* 24, n3) which actually make up their state of expectation when they reach their decisions, a relation which cannot be reduced to calculations based on relative frequency. The expected value of Classical probability theory is known (i.e. certain) as soon as the population frequency distribution is known, while an expectation in terms of Keynesian probability reflects the balance of available evidence but remains uncertain. The confidence with which an expectation is held depends on the weight of the evidence compared with the conclusive evidence of hindsight (or perfect foresight).

These ideas can be expressed in the mathematical symbols of *A Treatise on Probability*, with a view to clarifying precisely the difference between the Classical and Keynesian views of probability. Using Keynes's terminology, the expectation $\hat{x}$ of the outcome x is the value of $\hat{x}$ which satisfies

$$\left(x \geq \hat{x}\right)\big|\Omega \ = \left(x \leq \hat{x}\right)\big|\Omega \qquad\qquad (AP.1)$$

where this expression means that the probability (in Keynes's sense) that the outcome x lies at or above the expectation $\hat{x}$ equals the probability that the outcome lies at or below the expectation, given the available evidence Ω, including relevant propositions for and against each conclusion. Ω is a subset of $\overline{\Omega}$, the complete 'perfect foresight' information set from which x might be known with certainty, i.e. $x\,|\,\overline{\Omega} = 1$.

The 'expected value' $E[x]$ of Classical probability theory is in similar fashion given by the centre of gravity of the population relative frequency

density function $\varphi(x)$ (I use the term 'relative frequency' to distinguish probability based on frequency from Keynesian probability) such that

$$\mathrm{E}[x] = \int_{-\infty}^{+\infty} x\varphi(x)\,dx \qquad\qquad (AP.2)$$

whence it follows that

$$\int_{-\infty}^{\mathrm{E}[x]} \varphi(x)\,dx = \int_{\mathrm{E}[x]}^{+\infty} \varphi(x)\,dx = 0.5 \qquad\qquad (AP.3)$$

Equation (AP.3) is the Classical equivalent of equation (AP.1), in that x is as likely to fall above $\hat{x} = \mathrm{E}[x]$ as below it, with the difference that, if we *know* $\varphi(x)$, we *know* that, in the limit, half the 'drawings from the urn' will fall on one side and half on the other of the expected value $\hat{x}$. In Keynes's terms, $x|\varphi(x)=1$; the *expectation* (although not the outcome itself) is *known* with certainty (as opposed to merely probable in Keynes's sense) as soon as the frequency density function is *known*, since the conclusion follows from the evidence as a matter of strict logical implication: expected value is simply a mathematical transformation of the frequency density function. By contrast, in equation (AP.1), the information set Ω does not permit conclusive determination of the expectation $\hat{x}$ (let alone, *a fortiori*, the outcome x); or put another way, the two sides of equation (AP.1) do not 'sum' to unity (although strictly these Keynesian probabilities are not in general of the numerical form necessary for addition).

   While each side of equation (AP.1) depends on the balance of the evidence for and against each conclusion, the 'weight' of the argument for the expectation $\hat{x}$ depends on the relation between the available information Ω and the complete information $\overline{\Omega}$. Although no numerical comparison is possible between Ω and $\overline{\Omega}$, it is clear that if Ω is very scant, little confidence will be placed in the expectation; while if $\Omega = \overline{\Omega}$, there will be complete certainty and therefore absolute confidence. Thus the degree of confidence in the expectation $\hat{x}$ will depend, although not by a numerical functional relation, upon the weight of the evidence in Ω relative to the complete information set $\overline{\Omega}$, which in practice can only be known in retrospect.

   This understanding of Keynes's view of probability explains why he makes no reference to statistical variance anywhere in *The General Theory*. The concept of an expectation is of great importance to Keynes and in the above terms is represented by $\hat{x}$, the value which is most likely on the

balance of the evidence, and to which Keynes refers as the 'actuarial' value. What is missing from *The General Theory* is the extra assumption that an expectation can be justified in statistical terms based on observable frequency distributions. A corollary is that Keynes does not assume that uncertainty can be enumerated by a measure of dispersion such as variance. Thus the Old Keynesian reduction of uncertainty to variance by Tobin (1958) fundamentally undermines the meaning of liquidity-preference.

When Keynes refers to 'actuarial' risk, he means the expectation of loss on a portfolio of assets, most likely on the balance of evidence and perhaps indeed based, at least in part, on frequency tables, in the sense of the insurance underwriter. He expresses great scepticism about such calculations, despite being (indeed, because he was) the author of a treatise on probability and the chairman of an insurance company. These fields of expert knowledge are the grounds of his scepticism, since any acquaintance with the operations of Lloyd's reveals that the underwriter is far more a book-maker than a mathematician. This scepticism applies *a fortiori* to more sophisticated formulations of statistical risk in terms of 'states of the world', which do not necessarily assume a normal or other standard probability distribution whose dispersion can be fully described by the single measure of variance, but do require that each state of the world can be defined so that it is certain that one of these states will prevail (the two sides of equation (AP.1) sum to unity).

So the uncertainty and consequent risk on which Keynes places such emphasis in *The General Theory* are something rather different from random error and the corresponding loss function. Some authors accordingly prefer to limit the use of the term uncertainty to refer solely to this quite different concept associated with Keynes and also Knight (1921), but both Keynes and Classical authors tend to use them interchangeably in their own contexts and to mean different things, adding to the reader's confusion. Furthermore it is important not to identify risk with uncertainty itself, rather than with the loss to which uncertainty exposes us. Keynes makes *confidence* ('how highly we rate the likelihood of our best forecast turning out quite wrong' *G.T.* 148) the main measure of uncertainty, in the above terms the relation between Ω and $\overline{\Omega}$. Confidence is the converse of liquidity-preference, so that Tobin comes close when he defines 'liquidity-preference as aversion to risk': but the risk in question is Keynes's liquidity risk, and not the actuarial risk represented by variance.

AP.5   LIQUIDITY

AP.5.1   Fundamental uncertainty

There is no liquidity risk in Classical theory because expectations are reliable within the limits of random error. Classical theory struggles to find a role for money in the Walrasian general equilibrium system. The concept of liquidity is inextricably bound up with the concept of probability, and modern Classical economic theory has reduced uncertainty to random error by incorporating into its system the Classical frequency theory, rather than Keynes's logical theory, of probability. If uncertainty consists only of random error, the certainty-equivalent expectation can be discovered by repeated sampling. The expected value will converge on the population mean as the sample increases in size, and within the limits of merely statistical confidence the expected value becomes *certain*. The definition of uncertainty as no more than random error is the foundation of the so-called 'rational expectations hypothesis'.

It is his understanding that the world does not fit this modern Classical definition of uncertainty (which had not been fully developed in his time) that leads Keynes to write:

> Or, perhaps, we might make our line of division between the theory of stationary equilibrium and the theory of shifting equilibrium—meaning by the latter the theory of a system in which changing views about the future are capable of influencing the present situation. *For the importance of money essentially flows from its being a link between the present and the future.* We can consider what distribution of resources between different uses will be consistent with equilibrium under the influence of normal economic motives in a world in which our views concerning the future are fixed and reliable in all respects;—with a further division, perhaps, between an economy which is unchanging and one subject to change, but where all things are foreseen from the beginning. Or we can pass from this simplified propaedeutic to the problems of the real world in which our previous expectations are liable to disappointment and expectations concerning the future affect what we do today. (*G.T.* 293–4)

A theory of stationary equilibrium can describe not only a static stationary state, but also a dynamic steady state in which 'a steady increase in wealth or population may constitute a part of the unchanging expectation. The only condition is that the existing expectations should have been foreseen sufficiently far ahead' (*G.T.* 48, n1). The definition of uncertainty as random error leads to a theory of stationary rather than shifting equilibrium because,

although 'our previous expectations are liable to disappointment' through random error, we can be confident that these errors will average out. Random error is a typical symptom of disequilibrium and is characteristic of many physical systems which are otherwise entirely predictable within the limits of experimental error. Thus the Classical treatment of uncertainty amounts to an assumption that its only source is unpredictable variations in the individual behaviour of atomistic agents and in the parameters of technology and preferences, generating random error exactly as in the physical case of Brownian motion.

A stationary state with the addition of a random disturbance term and perhaps a deterministic trend can be described as an 'ergodic' system (Davidson, 1996, following Samuelson). The ergodic hypothesis was originally conceived by Boltzmann in developing the kinetic theory of gases in physical chemistry, to explain the behaviour of macroscopic volumes in terms of the Brownian motion of individual particles. The rational expectations hypothesis can be understood as taking markets to generate equilibrium prices in the same way that equilibrium temperatures and pressures are generated by the random collisions of myriads of gas molecules in a closed vessel with a fixed volume. However, the real world is far from stationary, even in this stochastic sense.

The theory of shifting equilibrium (which is the analytical core of *The General Theory*) recognises that the knowledge upon which we base our expectations about the long-term future is very limited. The most cursory study of history and the warnings of financial regulators bear witness to how foolish it is, particularly in the matter of investment, to assume that the past and present are a reliable guide to the long-term future. As Keynes puts it eloquently:

> The outstanding fact is the extreme precariousness of the basis of knowledge on which our estimates of prospective yield have to be made. Our knowledge of the factors which will govern the yield of an investment some years hence is usually very slight and often negligible. If we speak frankly, we have to admit that our basis of knowledge for estimating the yield ten years hence of a railway, a copper mine, a textile factory, the goodwill of a patent medicine, an Atlantic liner, a building in the City of London amounts to little and sometimes to nothing; or even five years hence. (*G.T.* 149)

By uncertain knowledge, let me explain, I do not mean merely to distinguish what is known for certain from what is only probable. The game of roulette is not subject in this sense to uncertainty…Or, again, the expectation of life is only slightly uncertain. Even the weather is only moderately uncertain. The sense in which I am using the term is that in which the prospect of a European war is uncertain, or the price of copper and the rate of interest 20 years hence, or the obsolescence of a new invention, or the position of private wealth owners in the social system in 1970. About these matters there is no scientific basis on which to form any calculable probability whatever. We simply do not know. (*C.W.* XIV, pp. 113–4)

The very real possibility of a change, in what we believe to be the most probable forecasts of what the future holds, is what undermines our confidence and causes us, in the absence of an incentive to do otherwise, to seek security by keeping our wealth in the form that we most expect to maintain its value, whatever the future may bring.

NOTES

1. The continuity between Marshall and Keynes and the importance of the differences between Marshall and Walras have been emphasised by a few writers, including most recently by De Vroey (2004). The Marshallian firm was at the centre of some of the earliest expositions of Keynesian analysis, such as Tarshis (1947), before the competitive microeconomics of Keynes came to be neglected. See also Reisman (1986), Rogers (1997) and Toye (1998).
2. Notably Dutt (1987) and Marris (1997), but see Trevithick (1992), Kahn in Marcuzzo (1994, p. 32) and Sardoni (2002) for examples of the contrary view.
3. The main purpose of this book is to explain *The General Theory*, so discussion of industrial and financial structure arises only in Section E.2 of the Epilogue, where I offer my own extension of some of his ideas.
4. Rogers (2006) has drawn out the practical dangers for central banking policy of confusing these subtle theoretical concepts. He emphasises that an electronic money system, in which the means of (final) payment plays a limited role, is by no means the same as the clearing house of a Walrasian auction. The perverse conclusion of Walrasian theory, that money reduces efficiency, reflects the non-monetary nature of the theory, in exactly the sense that concerned Keynes. The means of exchange need not be the means of payment, even if the means of payment is always acceptable as the means of exchange. Mankiw does not adequately distinguish these two from each other (2003, p. 77).
5. I use the term 'independent' rather than 'exogenous', mindful of the debate over the meaning of the latter in this context (Dow, 1997), although in my usage either would do. By exogenous I mean only outside the equilibrium model, which implies nothing about the distinction between independent variables and given parameters, nor about the use of the term in a looser sense, such as 'exogenous to the private sector'. For a recent introduction to the debate between 'horizontalists' and 'structuralists' see Fontana (2004).
6. Mankiw concentrates on the transactions demand for money and therefore on short-term rates (2003, pp. 271–3). In his model, the long-term (or long-run) rate of interest is determined by the supply and demand for loanable funds and not by liquidity-preference.
7. An extensive literature has explored the case for continuity in Keynes's thought between *A Treatise on Probability* and *The General Theory*. See Dequech (1999, 2003).