average cost (since price will have to equal marginal cost) – that is, at a point to the right of the lowest average cost. In this case, when average cost is not minimum, it means that there is at least one input which the firm is not using optimally.   In this price-taker case clearly sub-optimality is coincident with disequilibrium. This is most clear in the case of a linear-homogeneous production function. If we say there are positive excess profits then

$$X > (P_L/P_X)(L) + (P_K/P_X)(K).$$

If we also say the price-taker is at least maximizing profit with respect to L, equation [1.2a] holds (noting that j would equal zero for a price-taker). In this case, using [1.1] to substitute for X and [1.2a] we conclude that

$$MPP_K > (P_K/P_X).$$

This shows that the price-taking firm cannot be maximizing with respect to all inputs whenever it is making profits, and at the same time it does face a linear-homogeneous production function. This is the clearest case where a disequilibrium is necessarily a sub-optimum. We cannot discuss disequilibrium states separately from sub-optimal states.   Any disequilibrium economics must be about the behavior of people who are not optimizing. How can we explain disequilibrium states as demanded by so many theorists if our primary behavioral hypothesis in neoclassical economics is that everyone is a maximizer or optimizer?

2

Optimization vs Equilibrium

Involuntary unemployment has nothing to do with any metaphysical conundrum about 'free will.' It is a technical term used to describe a certain kind of (Walrasian) market failure.

Frank Hahn [1983, p. 225]

Should one think of the labor market as mostly clearing, or at worst in the process of quick return to market-clearing equilibrium? Or should one think of it as mostly in disequilibrium, with transactions habitually taking place at non-market-clearing wages? In that case presumably the wage structure is either not receiving any strong signals to make it change in the right direction or is not responding to the signals it receives. My own belief in this case lies with the market-failure side. That is to say, I believe that what looks like involuntary unemployment is involuntary unemployment.

Robert Solow [1980, pp. 2–3]

Theology in the thirteenth century presented the story of man and the world according to the devine plan of salvation. It provided the men of that age with an authentic philosophy of history, and they could afford to ignore the factual experience of mankind since they were so well assured of its ultimate cause and significance.

Carl Becker [1932, p. 17]

Discussing disequilibrium states and sub-optima separately is made difficult by the common viewpoint that identifies the market equilibrium with the co-ordinated independent optimization of all individual participants. Just how can any sub-optimum ever be an equilibrium? Or, how can any disequilibrium ever be an optimum? Obviously, there are four possible cases to consider: (1) sub-optimal equilibrium, (2) optimal

disequilibrium, (3) sub-optimal disequilibrium, and (4) optimal equilibrium. The last two were discussed in Chapter 1. As long as we insist that an equilibrium is possible if and only if all participants are optimizing, then either we have an optimal equilibrium or we have a sub-optimal disequilibrium. So, it would seem imperative to 'explain away' any sub-optimal equilibrium or optimal disequilibrium. Of course, to be acceptable any such neoclassical explanation must not ignore the requirements of methodological individualism. Specifically, any sub-optimal situation can only exist if there is at least one barrier that prevents individuals from exploiting the possibilities for improvement. We need to decide whether the barrier is an exogenous variable or an endogenous variable. If it is allowed to be an exogenous variable it must be a 'natural given', otherwise we would be inadvertently recognizing a non-individualist, non-natural given and would violate the requirements of methodological individualism. If we allow it to be endogenous, we beg the question as to why it is sub-optimal.

Any claimed optimal disequilibrium (i.e. a disequilibrium state which is optimal) must also be explained away. To do so we might consider what it would take to truly be in the best of all *possible* worlds. That is, a true equilibrium might never be possible because it would require impossible feats (such as the acquisition of perfect knowledge). So-called Keynesian 'involuntary unemployment' is a typical example. The disequilibrium state might be 'explained away' by noting that the state is still optimal relative to the disequilibrium prices. Since disequilibrium prices are usually identified only by showing that they are not the general equilibrium prices that we would calculate with a typical Walrasian (price-taker) model, it can sometimes be shown that the alleged 'disequilibrium prices' are an illusion created by the tendency to examine only the properties of *ceteris paribus* maximization in an unrealistic methodological individualist world. For example, the decision about how much of a resource such as labor to supply, in the usual textbook case of a labor-leisure choice, requires a utility function or preference map. However, that map depends on knowing the equilibrium prices for the goods to be purchased with the desired income. The labor supply curve that is derived for any set of 'disequilibrium prices' may not be the same as the optimal labor supply curve derived when every supplier knows the equilibrium prices. Thus, the alleged 'disequilibrium' in the labor market may actually be an equilibrium for the supply curve based on incomplete knowledge of the true equilibrium prices [see further, Clower, 1965]. In this way, then, it may be possible to explain the 'disequilibrium' away.

There are other difficulties with the idea of a sub-optimal disequilibrium. On the one hand, as Solow [1980] points out, unless we allow for trading at disequilibrium prices there is no possibility of observing a sub-

optimal disequilibrium. So, if we do not allow for trading at disequilibrium prices (non-market-clearing prices) then we will only be able to see optimal equilibria and nothing else! On the other hand, as Richardson [1959] argues, if we allow for trading at disequilibrium prices then we beg the question of why we would ever have an equilibrium in the first place. If both Richardson and Solow are correct, how could there ever be an economics of disequilibrium? In the remainder of this chapter we will examine how optimal disequilibria and sub-optimal equilibria are usually explained away.

1. Sub-optimality as Equilibrium: Externalities vs. Market Failures

It is all too easy for a bystander to think that what might pass for an equilibrium (simply because there is no on-going movement in the situation) is actually sub-optimal. The situation may be claimed to be sub-optimal because the bystander can imagine an optimum that is not being obtained. Typical examples include the usual complaints concerning traffic congestion, air and water pollution, over-fishing, etc. If there is room for more optimization, the question to be asked is, why have the decision-makers not made adjustments to obtain those conceivable gains? If we are to maintain the theoretical perspective required by any commitment to methodological individualism – that is, that all things not caused by nature are considered the results of decisions made by individuals and that only individuals make decisions – then our task is most difficult.

Whenever the bystander claims that the current equilibrium behavior of any individual is sub-optimal, implicitly the claim is that there are one or more non-natural constraints being imposed on the individual. This is because, if all constraints were natural, the situation may not be sub-optimal. The individual can only be expected to maximize subject to the givens that cannot be changed. So, how can the individual's state of equilibrium ever be sub-optimal? If the constraints are not naturally given then they are changeable. If the situation is sub-optimal at any point of time then the individual should endeavor to change them to reach an optimum. The usual assumption of maximizing behavior does not deny the existence of constraints. Maximization is always subject to constraints. It is in precisely this spirit that Marshall saw virtue in recognizing that some things take longer to change than others.

Any situation may be temporarily sub-optimal – this sub-optimality is only relative to an optimal state which cannot *yet* be reached. That is, the situation is optimal relative to what is possible in a short run, but it is

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sub-optimal relative to what is possible when enough time is allowed for the individual in question to change the constraints. The Marshallian theory of the firm is a paradigm of this distinction. The difference between the short-run and the long-run rests entirely on the notion that capital takes longer to change than labor. Of course, this is just a matter of methodology and not something profound concerning the intrinsic properties of labor or capital. One might claim today that contrary to Marshallian methodology, in some situations, due to contractual commitments, it is easier to change capital than labor. But the primary point at issue is that some things can be changed faster than others. And on this basis one might claim that a partial short-run equilibrium may be a sub-optimal long-run equilibrium merely because a long enough run has not been allowed to make all the necessary adjustments to reach the optimal long-run equilibrium. In other words, an optimal long-run equilibrium is one of many possible short-run equilibria – the one that happens to be a long-run optimum.

To explain away the sub-optimality of a short-run equilibrium on the basis of the claim that some variables can change faster than others still begs the question of what determines the relative speeds of adjustment. Unless the relative adjustment speeds are naturally determined then again the explanation of the individual's behavior is incomplete according to our neoclassical commitment to methodological individualism. As many Austrian economists argued years ago, the speed of adjustment for some variables is naturally given. For example, trees only grow at naturally given rates [see Wicksell, 1893/1954]. For this reason, Eugene Böhm-Bawerk saw the neoclassical choice to be one of deciding how long to wait before cutting the tree down, given that the rate of growth diminishes over time. A similar question arises concerning how long to wait before a bottle of wine is good enough to open.

The question here is whether the relative speeds are a matter of choice or whether they are natural givens, i.e. are constraints. If they are a matter of choice, under what circumstances would the individual in question choose not to change a constraint? If the individual chooses not to change a constraint in the short-run then any optimum subject to that constraint cannot be sub-optimal when viewed from any realistic long-run perspective. But this only begs the question about why the individual would choose not to change a constraint even though it is logically possible to change it. Does the necessary change (for the bystander's concept of long-run optimization) cost too much? This is the basis of the viewpoint often presented by the followers of Ronald Coase [1960]. Often the constraint facing one individual is the behavior of other individuals. Both individuals might be better off if they could find a way to establish mutually beneficial constraints. The cost of transacting a change in one of the constraints may exceed the benefits (i.e. the difference between the optimal situation and the current situation). Such transaction costs would have to be considered external to the individual decision-making process when viewed from the perspective of strict methodological individualism. The claimed sub-optimal state is thus seen as being optimal with regard to the barrier of transaction costs.

What is presumed by externality or transaction-cost explanations for the false appearance of sub-optimality is that the constraints can actually be properly evaluated. That is, to say that the reason there is no movement towards the bystander's conceptual optimum is that such a movement would cost too much, is to presume that the individuals all know the relevant prices needed to calculate those costs. This presents two problems. First, for there to be prices available there must be a market for the goods or services required for the process of reaching the optimum, since consumers are claimed to choose not to buy the needed goods or services at the going prices. Second, to accommodate this type of choice we have to have a vision something like Kelvin Lancaster's 'New theory of consumer theory' [1966]. He claims to explain such all-or-nothing choices based on given prices by noting that goods are consumed to obtain specific characteristics and two different goods may provide the same characteristics such that one of them may be economically redundant. If we do not adopt such a view, then we must say that either the price of the needed good is infinite or the consumer is facing a 'corner' equilibrium that is insensitive to small price changes (such as when the consumer has chosen a point at one end of the budget line). In all three cases the equilibrium situation can be explained as being the consequence of optimizing choices – not buying the goods or services is preferred and hence optimization is taking place. If all individuals are optimizing then, in accordance with methodological individualism, the equilibrium in question must be optimal.

2.   Sub-optimality as Market Failure

When we say a market exists we are implying that there is a finite price. Similarly, when we say a market does not exist, one might wish to express this as saying that the price is infinite. That is, the consumer cannot find anyone who will sell the good at a finite price. The idea that a price might be infinitely high is, nevertheless, difficult to imagine.

When there is no market for a good which is needed to reach the bystander's conceptual optimum, can the alleged sub-optimal equilibrium ever be explained away? How could any individual make an appropriate optimizing choice when there is no price? The price is

important information for any decision-maker and the market is a means of supplying that information. In other words, it is important to recognize that the market is a social institution which exists only because individuals choose to make it exist.

Obviously, there is a danger of an infinite regress here – that is, whether there exists a market for a market for a market for a market ..., *ad infinitum*. Whenever the perceived benefits from any conceivable market are less than the transaction costs of creating it, the regress will stop. In this sense, to say that the price of any good or service – even a market – is infinite may easily be interpreted as a market failure. But, also in the same sense, any claim of market failure can be explained away as an optimizing choice, a choice not to create the market in question.

The only methodological question here is whether there are any natural reasons why a given market for a needed good does not exist. Arrow [1974] claims that for some goods there are such reasons. The primary example is a good which is needed for almost all productive enterprises – namely, trust. Arrow claims that consideration of such a good reveals a very serious limitation of equilibrium-optimization analysis (and this is echoed by Hahn [1981]). The view is that it would be difficult to sell or buy trust since it immediately raises the question of infinite regress. As Arrow says 'If you have to buy it, you already have some doubts about what you've bought' [Arrow, 1974, p. 23].

While it might be easy to yield to Arrow's point that there are exogenous (natural) reasons why there cannot be a market for some goods, it would be premature to reject neoclassical theory for this reason. After all, if the reason a market does not exist is exogenous, then this is a *prima facia* explanation for why the alleged sub-optimal equilibrium is really an optimum. The basis for this stronger-than-Coase conclusion is methodological individualism itself.

3.   Disequilibrium as Optimality

If any apparent sub-optimal equilibrium can so easily be explained away as an optimal equilibrium, can one also show that any alleged optimal disequilibrium is really an optimal equilibrium? In some sense, one might see that this is just what Keynes was attempting in his *General Theory* [1936] – at least if we view it from Clower's perspective [1965]. The question at issue is, can neoclassical theory (a theory constructed in accordance with methodological individualism) ever account for any optimal disequilibrium state. In particular, must a disequilibrium in the labor market (i.e. less than full employment at the prevailing wage-rate) always be seen as the result of sub-optimality, that is, of a failure of

participants to optimize individually?

The usual excuse given for persistent excess supply of labor is some alleged price rigidity which does not allow any adjustment to eliminate the excess supply. If one takes this line to explain unemployment then methodological individualism requires that reasons be given for any alleged rigidity – and the reasons cannot include any claim that the rigidity is exogenous since prices are not naturally fixed phenomena. But if the rigidity is not exogenous then it could be explained as an object of optimizing choice [e.g. Gordon, 1974]. Unfortunately, this line of explanation leads one to claim that all alleged unemployment is voluntary. In opposition, Solow claims that if it 'looks like involuntary unemployment [it] is involuntary unemployment' [1980].

Clower claims that the question of rigidity misses the point of what Keynes was complaining about. There is no need to give an explanation for any rigidity of prices since what we have here is an optimal 'disequilibrium'. That is, we have a disequilibrium where every individual is actually optimizing and thus there is no reason for anyone to change their behavior such that the disequilibrium would be eliminated. Clower shows that if one gives up the necessity of Walrasian prices (ones which presume a general equilibrium among autonomous price-takers) then it is quite possible that at non-Walrasian prices (non-market-clearing prices) all consumers may be in equilibrium at the alleged disequilibrium wage rates. If the supply curve for labor is derived in the usual manner but now as merely the consequence of individuals' optimizing labor-leisure choices with respect to the given disequilibrium prices for consumption goods, then the supply curve will not be the one based on equilibrium prices. At such non-Walrasian prices for consumption goods the supplied quantity of labor can equal the demanded quantity. Similarly, all consumers can be maximizing their respective utility given their respective incomes derived from the labor supplied. In other words, the alleged disequilibrium (unemployment) is really an equilibrium even though it is not the Walrasian general equilibrium corresponding to full employment.

What is interesting here is that, not only is all this consistent with methodological individualism since no non-natural exogenous variables have been introduced, but the end result is difficult to distinguish from the neoclassical explanations which explain away the appearance of sub-optimality rather than the appearance of disequilibrium. What makes Keynes' viewpoint superior in the eyes of some is that it does not presume the existence of Walrasian (general equilibrium) prices to establish the existence of an equilibrium where all participants are optimizing. The key issue here is that it would be difficult to deny the possibility of Clower's interpretation of Keynes unless one can give an analytical general ('uniqueness') proof that there is one and only one set

of prices and quantities (namely, full employment levels) where universal maximization is possible. But even worse, if there were such a uniqueness proof then the old philosophical 'free-will vs. explanation' problem would seem to appear again.

4.   Disequilibrium as Information Optimality

More recent efforts to deal with either optimal or sub-optimal disequi-libria attempt to explain them as being the result of imperfect infor-mation [e.g. Stiglitz, 1975, 1979; Solow, 1979]. A disequilibrium is claimed to be the result of natural constraints on any acquisition of the perfect knowledge supposedly needed to assure the achievement of an optimal equilibrium. What is supposed is that for any equilibrium to exist there must be perfect knowledge [Hayek, 1933/39; Richardson, 1959; Shackle, 1972; etc.]. Before questioning this supposition, let us examine the reasons why some general equilibrium theorists claim that the existence of imperfect knowledge is evidence of a state of dis-equilibrium.

Consider a closed economy or even the whole world. We know some general facts about any such economy. First, as a simple matter of accounting, aggregate excess profits must be zero. If any one individual is making excess profits, then at least one other individual must be suffering losses [i.e. no 'Santa Claus', see Samuelson, 1972, p. 477]. Second, if we think of the economy as being a very large firm then as a matter of elementary mathematics, the economy's production function must exhibit constant returns to scale whenever all inputs and outputs are endogenous variables – that is, the production function must be linear-homogeneous (see Ch. 1). Whenever any individual firm is facing increasing returns, then at least one other firm must be facing decreasing returns. Third, in a state of either the Walrasian general equilibrium or Marshallian long-run equilibrium, whenever all individual firms are making zero excess profits while maximizing profits, all must be facing (local) constant returns to scale [see Baumol, 1977].

With these three facts in mind, let us examine what is claimed to be the role of information. Many general equilibrium theorists often claim that if information (and knowledge) is a produced good, then there must always be increasing returns in such an industry [see Arrow, 1962/71, pp. 150ff]. The primary reason for this view is that knowledge, once produced, can be duplicated without cost and thus cannot be appropriated. This inability to appropriate the full profit for the creation of information reduces the incentive to enter the information-producing industry. All this supposedly leads to an underproduction and underutilization of information. In this sense the information industry will never have enough producers to bring about perfectly competitive conditions. Even though it is always possible that more information could improve someone's profitability (e.g. by reducing the costs of risk-bearing), the information is not produced. It is possible for someone to conclude here that any insufficiency of information means that there will always be an excess demand for information and thus even when all producers (and consumers) are optimizing with the available information, there will always be a disequilibrium in the information market.

Whether this is an optimal disequilibrium or a sub-optimal equilibrium is an arbitrary matter of viewpoint. If one accepts this pessimistic view of the information industry, then any state of general equilibrium will have some inconsistencies which may imply sub-optimality. If we are in a Marshallian long-run equilibrium with every producer making zero excess profits, then it will follow that not all producers are optimizing. To see this, consider a long-run equilibrium as shown in Figure 2.1(a), (b) and (c). Figure 2.1(a) represents the alleged imperfectly competitive equilibrium for any information producer. It will be maximizing (at Q_i)
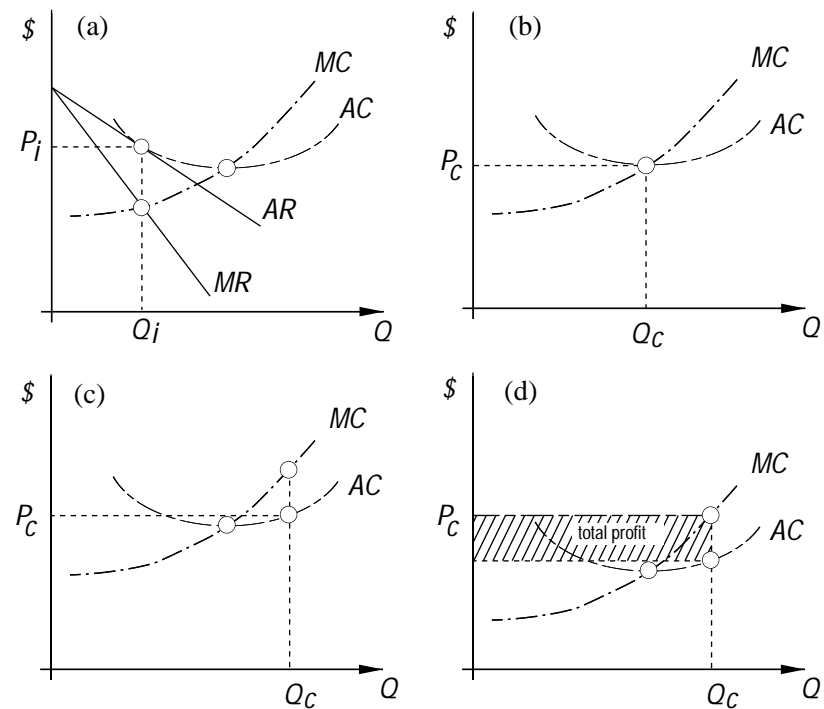

Figure 2.1. Increasing returns in competitive equilibrium

where marginal revenue (*MR*) equals marginal cost (*MC*) and the absence of profits leads to a price (P_i) equal to average cost (*AC*). Figure 2.1(b) represents the situation facing an optimizing perfect competitor (i.e. facing any firm not producing information). This small commodity-producing firm will set its output at a level (Q_c) where its market-given price (P_c) equals its marginal cost and, since we require no profits for a state of equilibrium, marginal cost equals average cost.

If there is only one firm (or industry) that is in a state of imperfectly competitive equilibrium, Figure 2.1(a), then there must be at least one commodity-producing firm that is not facing the situation represented by Figure 2.1(b). Since the economy as a whole must have constant returns to scale (neither falling nor rising aggregate average costs) there must be one firm facing the situation represented by Figure 2.1(c) – one where the firm is producing at a level where its (short-run) average cost is rising even though it faces a linear-homogeneous production function like all other perfectly competitive firms. Now either the firm's excess profits are zero but not maximum (at P_c marginal cost is above the price) or, if profits are at a maximum, they are not zero (which is contrary to our original requirement for a state of equilibrium) – compare Figure 2.1(c) and (d). If all other firms in this world are making zero excess profits then so must this firm be making zero profits (i.e. the world's aggregate excess profit must be zero as a matter of accounting) and it follows that at least one firm is not optimizing. Taking this view we see why it can be claimed that if information production is always imperfectly competitive then the possibility of an optimum general equilibrium is precluded. If we define a state of equilibrium as the absence of incentives for industry growth or decay – that is, as the presence of universal zero profits – then at least one firm is not optimizing. If we define equilibrium to include universal optimization (which is how Walrasian general equilibrium theorists define it) then no equilibrium could ever exist. In order for this to be acceptable in accordance with methodological individualism, it must be demonstrated that 'increasing returns to information' can be explained as a natural phenomenon. Of course, this explanation via natural phenomenon presumes that perfect knowledge can only be achieved by (or is defined on the basis of) inductive logic or inductive learning.

Since the existence of increasing returns would mean that all possible gains are not exploited (average costs can still be reduced), it is claimed that any general equilibrium which includes information as one of the goods must not be optimal [see also Hollis and Nell, 1975, pp. 136–7]. Now, if we stick to the more general definition of an equilibrium where there is no incentive for growth or decay (every firm's excess profit is zero), the question is whether the existence of increasing returns in the

information industry should always be considered sub-optimal. After all, it might simply be claimed that the limitations on induction are a natural externality and thus, the equilibrium is still the best we can do in less than an infinite amount of time. But, the amount of information produced and acquired is endogenous and so this avenue for explaining away any apparent sub-optimality is precluded, except if we recognize that the production of information is costly. From the inductivist viewpoint, it is always too expensive to collect sufficient information to remove all possibilities of improving knowledge [e.g. Stigler, 1961]. It is important to recognize here that the claim that there is always room to improve knowledge is completely based on inductivism. Without a presumption that all learning is inductive, a decision-maker's knowledge (or expectations) can be true – even if only by accident.

Inductivism will always lead to a view that the knowledge required for the achievement of an optimal equilibrium will necessarily be imperfect whenever knowledge is limited by real time and real space. Still one can claim that the degree of imperfection of one's knowledge is optimal. The microeconomic version of the rational expectations hypothesis is an example of this. If one's expectations are imperfect but to an optimal degree, then the consequences of making optimization decisions on the basis of this imperfect knowledge will still be optimal in any realistic sense of equilibrium (that is, without assuming an unrealistic amount of time or space). While believers in the usefulness of the rational expectations hypothesis will be quite satisfied with this concept of an optimal equilibrium, some general equilibrium theorists are not. This is because increasing returns in information still implies that the equilibrium is not optimal in the Pareto sense [see Fisher, 1983]. Pareto optimality merely defines an optimum equilibrium to be where there cannot exist any way for one individual to gain without making someone else worse off.

5.   Methodological Costs/Benefits of Invisible Equilibrium Prices

An interesting alternative to explaining away sub-optimal equilibria is to claim that the appearance of decreasing average cost (such as claimed for the production of information) is misleading for two reasons. When purchasing any good, the price on the price tag never accounts completely for the total price paid by the consumer. The total price paid should include the transaction costs such as the time lost while waiting in the queue at a supermarket or an airline ticket counter. Some of these usually excluded transaction costs should also be included in the

calculation of the true average cost incurred by the producer [see DeVany, 1976].

What is claimed in this view of invisible prices and average costs is that if there really is an equilibrium in the industry in question then there should be no increasing returns – that is, no decreasing average costs. This means that, while it might appear that the demand curve is tangent to the average cost curve at some output level to the left of the minimum average cost as in Figure 2.1(a), the correctly calculated situation for the equilibrium output level has the true average cost curve at its minimum; and the true average revenue curve is tangent to the average cost curve at this same equilibrium level of output as in Figure 2.1(b).

We may be cavalier in calling these 'invisible' prices or 'invisible' costs, nevertheless, there surely are some methodological costs in this manner of explaining away apparent sub-optimality of an equilibrium. How would one ever empirically test such an explanation? Each consumer of the product faces a different (total) price even though they all face the same price-tag. In this world, what information is imparted by the price system? The usual general equilibrium analysis, typical of existence proofs and stability proofs will become excessively complicated and certainly no more testable. Certainly, all analyses of economic policies using benefit-cost comparisons based on measuring consumer surplus would be rendered virtually meaningless.

If the invisible-prices approach to sub-optimal equilibria is considered unacceptable, the problems concerning the implications of the role of information in any state of equilibrium is still lurking behind the scenes. But again, if there is a problem of implied sub-optimality of any equilibrium which requires a role for information and knowledge, it is *only* because economic theorists take inductive learning for granted. While rejecting a necessary role for inductive learning would avoid the problem and any need to consider invisible prices, there remains the question of how knowledge is acquired in the neoclassical conception of optimal decision-making.

In this chapter we have seen that it is often easy to explain away sub-optimal equilibria or optimal disequilibria. Once these aberrations are explained away, we are left either with the usual equilibrium situation to explain how any static equilibrium is just the situation that we want, or with the sub-optimal disequilibrium situation to explain any dynamics in the economy that follow from individuals realizing that they still are not optimizing. Either way the basis of our explanation is the concept of an optimal equilibrium and thus we now turn to examine this method of explanation more closely.

Part II

Foundations of Equilibrium Methdolology