# Methodology for a New Microeconomics

## The Critical Foundations

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# Methodology for a New Microeconomics

*To my students from Milwaukee to Vancouver who question and criticize when they cannot understand.*

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# Preface

> Secondary roads are preferred. . .. It was some years ago that [we] first began to catch on to these roads ..... [T]hese roads are truly different from the main ones. The whole pace of life and personality of the people who live along them are different. They're not going anywhere. They're not too busy to be courteous. The hereness and nowness of things is something they know all about. It's the others, the ones who moved to the cities years ago and their lost offspring, who have all but forgotten it. The discovery was a real find.
>
> I've wondered why it took us so long to catch on. We saw it and yet we didn't see it. Or rather we were trained *not* to see it. Conned, perhaps, into thinking that the real action was metropolitan and all this was just boring hinterland. It was a puzzling thing. The truth knocks on the door and you say, 'Go away, I'm looking for the truth', and so it goes away. Puzzling.
>
> Robert Pirsig [1974, pp. 4-5]

Over the last twenty-five years an ever widening gap has appeared between what we teach economics undergraduates and what we expect graduate students to understand. The gap is due entirely to our graduate theory classes since the microeconomics we teach our undergraduates has not changed significantly from what we taught in the late 1940s. Today the gap between what we teach at these two levels is such that it amounts to a contradiction.

Graduate microeconomic theory is considered a 'new microeconomics'. Graduate students are supposed to be concerned with the 'disequilibrium foundations' of equilibrium economics rather than with the static descriptions of a market where demand equals supply. The old microeconomics that we teach undergraduates is concerned with only a simple appreciation of the virtues of a world governed by a market system – that is, an appreciation that if everyone were guided by market determined prices and were satisfied by making their decisions independently, we would have an equilibrium which is the 'best of all possible worlds'. While graduate students are supposed to understand 'disequilibrium economics', undergraduate students are sup-

posed to be satisfied with equilibrium models alone.

This gap is at best unfortunate and at worst educationally unjustifiable. If we have learned anything over the last twenty-five years it is that we have been teaching undergraduates more about a fantasy world than the world we see outside our window. Unless we know why an economy is in a state of equilibrium, we know very little. Moreover, unless we know that the world outside our window is in a state of equilibrium, there is little that can be explained. We are leaving our undergraduate students woefully unprepared to deal with the real world – despite the usual promises made to them.

Teachers of undergraduate economics almost always think it is necessary to simplify the idea of equilibrium so that students can learn the 'important' ideas. However, the simplification seems to 'throw the baby out with the dirty bath water'. The simplification here is the view that a market equilibrium is just the equality between demand and supply. A more complex view recognizes that it is possible to think of an equality of demand and supply in a market where demand curves are upward sloping and supply curves are downward sloping. Everyone will immediately dismiss this observation by saying that it is only concerned with an 'unstable equilibrium'. But anyone who has used the idea of an equilibrium in other disciplines will be puzzled by the concept of an 'unstable equilibrium' since it is self-contradictory. To avoid the contradiction, we must appreciate that any equilibrium-based explanation of the economy must imply a 'stable equilibrium'. The economics we teach undergraduates fails to provide such an explanation. It is for this reason that graduate students have to worry about what is called 'stability analysis'.

As a student, economic theory made little sense to me until I was introduced to stability analysis. And when I began teaching economic theory I found it easier to explain the reasons for our assumptions if I first explained the basis for the stability of the usual textbook market – the market with downward sloping demand curves and upward sloping supply curves. In particular, I found it much easier to explain why so much of consumer theory is concerned with showing that, even though individuals make their consumption decisions autonomously and independently, the market demand curves will always be downward sloping whenever consumers are optimizers. It is also easier to see why microeconomics must imply that supply curves are upward sloping as a consequence of the nature of the scarcity that faces profit maximizing producers. What the textbook market ensures is the possibility of truly autonomous individual decision-making. I tried to demonstrate this approach to teaching microeconomics in a textbook manuscript [Boland, 1967], but publishers, while saying that it was clearly written, never thought there was a market for it. I found this puzzling since microeconomics makes little sense without an appreciation of

elementary stability analysis.

Today, I think I can understand where I went wrong. An approach to teaching microeconomics that stresses questions of stability analysis must promote a self-consciousness about explanatory methodology. What I had failed to appreciate was that most economists consider methodology to be a waste of time. In my 1982 book [Boland, 1982a] I showed why methodology is an essential part of the economics we teach. But that book does not address the more elementary problems of stability analysis that can be appreciated by undergraduate economic theory students.

In this book I offer a critical examination of neoclassical models which typically fail to include an explicit stability analysis. I show that much of the sophisticated theoretical literature over the last thirty years can be understood as *ad hoc* attempts to overcome the deficiencies of models that are limited by the absence of stability analysis. At the end of this book I explain what we must do to update undergraduate theory, and above all, to develop a truly individualist version of microeconomics that is both complete and consistent with the methodological principles of all neoclassical models.

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*1 September 1984*

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# Introduction

## ON THE FOUNDATIONS OF COMPARATIVE STATICS

> We have now to examine the general relations of demand and supply; especially those which are connected with that adjustment of price, by which they are maintained in 'equilibrium'. This term is in common use and may be used for the present without special explanation. But there are many difficulties connected with it, which can only be handled gradually.
>
> Alfred Marshall [1920/64, p. 269]

> It may seem discouraging that brilliant mathematical economists are able to prove little more than they assume in this area, but there may be a methodological problem that inhibits progress. No sooner is a mathematician let loose on non-market-clearing problems than he attempts to prove the existence of a static equilibrium in which there is no incentive for an agent to change prices. Perhaps the fixation on equilibrium is a crucial handicap.
>
> Robert J. Gordon [1981, p. 514]

> One sometimes has the impression that there are only two groups of economists: those who do not understand a difference equation; and those who understand nothing else.
>
> Joseph Schumpeter [1954, p. 1168]

This book is a methodological examination of neoclassical economic theory. It is primarily concerned with one fundamental analytical tool of neoclassical economics – namely, the idea of an economy being in a complete state of equilibrium. There seems to be widespread agreement that what is taught in traditional textbooks about equilibrium falls far short of providing an adequate methodological foundation for its unquestioned use as a basis for explaining the behavior of individual consumers and producers. Recent efforts to repair neoclassical equilibrium models have unfortunately been directed at identifying *ad*

*hoc* assumptions about disequilibrium behavior. As these efforts seem to beg more questions than are answered, we will examine them to see how a more adequate foundation for complete neoclassical explanations of the behavior of autonomous individual decision-makers might be provided.

## 1. Equilibrium and Explanation

The concept of equilibrium has been central in economics for over 200 years, that is, since the time of Adam Smith. For Smith and many of his followers the concept has often been used to explain away supposed evil human tendencies such as 'greed' by showing that, in a state of competitive equilibrium, greed will actually lead to the good of everyone. Picture an economy in a textbook state of general competitive equilibrium. In such a state each individual is personally optimizing, given his or her respective resources, and there is no way any self-interested individual can get ahead except by being greedy. Should we think that greed is a social evil we must not despair since such a greediness, constrained by the state of equilibrium, can be seen as a 'virtue' rather than a 'vice'. Supposedly, any state of equilibrium exists only because, given the constraints which are actually imposed by nature and the state of technical knowledge, no possible gains not already exploited by one or more self-interested individuals exist.

In the state of general competitive equilibrium all producers must be just covering their costs, including opportunity costs; in other words, everyone's excess profits must be zero. If excess profits were not zero there would be an incentive either for new firms to start up or for losing firms to go out of business. In a state of general equilibrium every firm is maximizing profit subject to given constraints, even though the maximum happens to be zero. Thus, to make more profits, the given constraints must be changed. One changeable constraint is the current state of technology. A new technique which will lower the average cost of producing any good can create an advantage in the market that will yield excess profits. While one might still think such profits are immoral – since the producer is able to sell at a price that is higher than that just necessary to produce the good in a state of equilibrium – it is easy to show that if there are no artificial (i.e. no non-natural) constraints on competition, then the existence of excess profits for one producer represents an incentive for others to imitate the new technology. And, so long as the incentive exists, more and more producers will imitate until any incentives (excess profits) disappear. The result is both an elimination of the 'evil' advantage and a general reduction of costs. The latter is a benefit to everyone. Under these circumstances –

namely, the absence of restraints on competition – 'greed' will be seen to be a 'virtue' rather than a 'vice'.

In technical economics literature everything above is taken for granted. The concept of equilibrium is usually embraced for reasons other than its role in Smith's social philosophy of private goods and social evils. The reasons are to be found in Alfred Marshall's self-conscious theory of 'scientific explanation' which today is called 'comparative statics'. Marshall claims that 'this is the only method by which science has ever made any great progress in dealing with complex and changeful matter, whether in the physical or moral world' [Marshall, 1920/64, p. 315, footnote 1]. Comparative statics explains things in a very special way. In modern textbooks, we are told to distinguish between endogenous and exogenous variables. The variables that we want to explain are called endogenous variables and their explanation is always conditional, that is, endogenous variables depend on certain givens called exogenous variables – usually these are such things as tastes, technology, resource availability, government regulations, etc.

As long as the exogenous variables do not change, the equilibrium values of the endogenous variables will not change. To explain the endogenous variables we show that their values can be deduced with the hypothetically known values of the exogenous variables and the help of a behavioral theory (or model) which logically connects all the variables in question. In comparative static analysis two different sets of values for the endogenous variables, representing two different states of equilibrium, are compared. The two equilibrium states are distinguished only by the value of a single exogenous variable being different. A typical example explains how demand would change if (exogenous) tastes change in favor of one good. The argument would usually go that *ceteris paribus* the (endogenous) price of the good would increase. The term *ceteris paribus* is only shorthand for the technique of comparative statics explanation, namely that all other exogenous variables do not change while the new value of the endogenous variable (price) is being determined. What is being explained is the differences in the values of the endogenous variables (the non-givens) and thus the effect or the role of the one exogenous variable in question. In a limited sense, the differences are explained by the change in that one given variable, since within the confines of the comparison the only reason for any differences is the singular exogenous change. If this is all one wishes to explain – namely the *ceteris paribus* influence of each exogenous variable on the equilibrium values of the endogenous variables – then comparative statics is a very powerful method.

Almost all of our understanding of the economy is based on careful applications of the method of comparative statics. Even the multiplier

in macroeconomic analysis is based on this method. Critics might want to attack directly the significance of a method of explanation that only examines the role of one exogenous variable at a time. But to the contrary, the acceptability is assured by an elementary understanding of differential calculus and the idea of a partial derivative. In effect, the results of any change in one exogenous variable is analogous to the meaning of a partial derivative. Generally speaking, one can look at any point of equilibrium as being the outcome of changes in many exogenous variables such that the change in each endogenous variable (i.e. the total differential) is the sum of the changes in all exogenous variables, each of which is weighted by their partial derivatives. For example, the change in one endogenous variable $X$ can be seen to be determined by the sum of possible changes in the exogenous variables, $Y$ and $Z$, such as in

$$dX = (\partial X/\partial Y)dY + (\partial X/\partial Z)dZ.$$

In effect, the partial derivative is a measure of the contribution of one unit of an exogenous variable to the total change. In comparative static analysis either $dY$ or $dZ$ would be zero; and since we are only discussing changes in the equilibrium values at least one set of values for all endogenous and exogenous variables is known. In order to explain the initial equilibrium values, ideally all we would need is an explanation of the equilibrium value of each endogenous variable such as $X$. An explanation might be provided either by performing an integration over the range of the values of the exogenous variables or by solving an appropriate differential equation. With a little matrix algebra all of this is easily extended to deal with all endogenous and exogenous variables simultaneously in the same manner.

One well-known critic of Marshall's method, Piero Sraffa [1926], explicitly rejected any method based on *ceteris paribus* and argued for the necessity of using general equilibrium analysis. For him general equilibrium analysis was implied by the necessity of considering imperfect competition. The reason was simple. Consider the usual textbook explanation of a price-taking individual's demand curve for good $X$ subject to two givens, the individual's income (or budget) and the price of any other good, say $Y$. A change in the quantity demanded of $X$ (along the demand curve) is the result of the *ceteris paribus* change in the price of $X$. Except in special cases, where the demand elasticity is unitary or the number of demanders is infinite, the quantity demanded of the other good, $Y$, will also change. This means that if the original given price of $Y$ was an equilibrium price (as in any comparative statics analysis) then any change in the demand for $Y$ must cause a disequilibrium in the market for $Y$. Similarly, a price-taking producer considers

different levels of output to supply for a given price by comparing the different levels of marginal cost to the price. The firm is a price-taker only when there is virtually an infinity of sellers. If the number of sellers is finite, not only does the level of the marginal cost change with the level of output but so does the price – just as it does in the textbook explanation of the firm under imperfect competition. But, as Sraffa in effect argues, a complete explanation must explain how the price varies with the level of output and thus requires consideration of the behavior of all participants in all markets. Thus for Sraffa, either one accepts *ceteris paribus* (i.e. partial equilibrium) analysis or one's explanation of an individual's behavior requires general equilibrium analysis and imperfect competition.

## 2. Equilibrium Implies Disequilibrium Dynamics

Consideration of general equilibrium does not necessitate a rejection of any use of partial derivatives. The mention of matrix algebra above recognized that it is possible to deal with partial derivatives in a system of simultaneous equations. While Sraffa's critique concerns Marshall's use of partial derivatives, the emphasis on the necessary role of imperfect competition does not require the rejection of partial derivatives. This is clearly demonstrated by Joan Robinson [1934/69] who, while criticizing Marshall's method in her famous book on imperfectly competitive equilibria, made explicit use of partial derivatives. While the keystone of comparative statics is the thorough use of partial derivatives, both critics and proponents of equilibrium analysis accept the use of partial derivatives. If the idea of a partial derivative is acceptable, there would seem to be little to argue about here.

Many arguments have been advanced in the last twenty-five years that seem to suggest we spend too much time analyzing equilibrium states and that we should be worrying more about everyday disequilibrium phenomena. Doubts about calculus or partial equilibrium analysis are not the source of current interest in disequilibrium economics. The current doubts about basing all economics on the concept of equilibrium stem from the analysis of the necessary conditions for equilibrium regardless of how the equilibrium is reached or analyzed. In some sense, the current interest in disequilibrium economics was motivated by the work of John Maynard Keynes [see Richardson, 1959; Clower, 1965]. Robert Clower, for example, explicitly claimed that Keynes did not reject orthodox equilibrium theory but only argued that it could not provide an adequate account of (short-run) disequilibrium macroeconomic phenomena; the theory of market equilibrium does not allow transactions to take place at disequilibrium

prices (i.e. before reaching equilibrium prices).

The microeconomic theorist's concern is more fundamental and has two different sources. The first started with Kenneth Arrow [1959], who explicitly identified a possible contradiction between the assumptions used to explain the behavior of individuals in a state of equilibrium and those necessary to explain the adjustment of prices in a state of disequilibrium. As Arrow saw it, perfect competition was consistent with any state of equilibrium but a disequilibrium would require an explanation of the movement toward equilibrium based on imperfect competition. The second source of current interest in disequilibrium economics has been the related concern for the knowledge requirements of any participant in a state of equilibrium [Richardson, 1959; Barro and Grossman, 1971; Solow, 1979]. Let us consider, in turn, these two microeconomic perspectives on disequilibrium concepts.

| | *Demand* | *Supply* |
|---|---|---|
| | $d_1$ | $s_1$ |
| | $d_2$ | $s_2$ |
| | $d_3$ | $s_3$ |
| | . | . |
| | . | . |
| | . | . |
| | $d_m$ | $s_n$ |
| Totals: | $(d_1+d_2+\ldots+d_m)$ | $(s_1+s_2+\ldots+s_n)$ |

*2.1. Equilibrium vs. Imperfect Competition*

The problem addressed by Arrow [1959] is fundamental even though it has not caused any major revolutions in economic methodology. To appreciate his problem consider a market of $m$ buyers and $n$ sellers. At any given price each participant decides either how much to buy to maximize utility or how much to sell to maximize profits. The total demand is the sum of all the $m$ individuals' demands and the total supply is the sum of all the $n$ individuals' supplies. If the given price is the equilibrium price, the total demand will just equal the total supply. In such an equilibrium state each individual need only consider the given price and his or her private circumstances (income, resources, technology, etc.). Given the equilibrium price they will all unintentionally choose quantities which are market clearing – regardless of the number of buyers and sellers. But, what happens if the market participants are not given the equilibrium price? To answer the question, consider the following table for any given price ($P$):

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