THE INVISIBLE HAND AND MODERN WELFARE ECONOMICS

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ABSTRACT

This paper reviews and puts into perspective recent work reassessing the first and second Fundamental Theorems of Welfare Economics. It assesses the implications of the Greenwald-Stiglitz Theorem establishing the (constrained) Pareto inefficiency of market economies with imperfect information and incomplete markets as well as recent work on endogenous technological change. The information theoretic limitations to the Second Fundamental Theorem are also discussed, including the inability to separate out issues of equity and efficiency. The final sections of the paper consider the consequences of these problems for economic organization, economic policy, and the role of ideology in the belief in the Invisible Hand.

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The Invisible Hand and Modern Welfare Economics[1]

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Somewhat more than two centuries ago, Adam Smith delivered at this University a set of lectures, later written down in his monumental work, The Wealth of Nations, which perhaps had more influence on the development of our discipline than any other work in the history of the subject. And among the ideas presented there, perhaps none has held such sway, not only over professional economics, but also over all those who concerned about how best to organize society to promote the General Welfare than his concept of the invisible hand: this, in spite of the fact that he explicitly used the term only once in The Wealth of Nations.

Smith argued not only that individuals were led in the pursuit of their self interest by an invisible hand to pursue the Nation's interest, but also that this pursuit of self interest was a far more reliable way to ensure that the Public Interest would be served than any alternative--surely better than relying on some government leader, as well-intentioned as that leader might be.

Much of the subsequent history of our discipline has been a search to understand the sense and conditions under which Smith's essential insights are valid. His perspective has provided the intellectual basis for a theory of economic organization--competitive markets provide an efficient way of organizing economic activity--and economic policy--to ensure that efficiency

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is attained, it is best to rely on markets and individual self-interest. George Stigler is quoted (by A. Skinner, 1976) as having said, on the occasion of the celebrations marking the two hundredth anniversary of The Wealth of Nations, that Smith is alive and well and living in Chicago. Whether Smith really would be as happy at Chicago as he would be, at say, Stanford or MIT need not detain us here. He certainly recognized the existence of what today we would clearly describe as important classes of market failures.[2]

The Fundamental Theorems of Welfare Economics are generally viewed as the culmination of this search for a precise interpretation of what I shall refer to as the Smithian view. (The form in which these theorems are stated today is generally attributed to Kenneth Arrow (1951) and Gerard Debreu, 1959.) The first theorem states that (under certain conditions) the competitive economy is always Pareto efficient[3]; the second theorem says that every Pareto efficient allocation can be attained through the price

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[2] Indeed, in that single passage in The Wealth of Nations in which he uses the term invisible hand, he invokes the notions of risk aversion and (implicitly) imperfect risk markets to explain why capital was imperfectly mobile across national boundaries. And for him, this market imperfection was a good thing, for it ensured that the savings of the nation, its capital, would be used to increase the wealth of the nation, rather than the wealth of some other nation. This passage seems to suggest that Smith did not have in mind a notion of a perfect market.

If he had been born a little later, he might have used evolutionary ideas to explain how it was that economic and social institutions evolved which had the property that the common good was attained as a result of individuals pursuing their own self interest. As it was, the general principle behind the invisible hand was left rather vague; the numerous instances in which it manifested itself (although without using the term) made it clear that there was some general force or principle at work.

[3] That is, no one can be made better off without making someone else worse off.

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system. All(!) the government needs to do is engage in some initial lump sum transfers (taxes and subsidies).[4]

The conditions under which the First Theorem are true turn out to have important economic interpretations. Interpreting those conditions and identifying policies by which Pareto efficiency can be restored provides the basis of what has come to be called the Market Failure approach to Modern Welfare Economics. Early discussions of market failure (e.g. F. Bator, 1958) focused on externalities, natural monopolies, and public goods. But the conventional wisdom held that even when such market failures arose, only limited government intervention was needed: for instance, fines for pollution, congestion tolls for the externalities associated with crowding. Only in the case of pure public goods did government have to be actively involved, if not in producing the goods, at least in financing them (there remained a debate about the advantages of government versus private production.).[5] [6] Later discussions (reflected in this essay) focused on

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[4] Lump sum transfers are transfers, the magnitude of which do not depend at all on variables which cannot be altered by the individual. When transfers depend on variables which can be altered, the individual has an incentive to distort his behavior, in order to increase the magnitude of his subsidy or reduce the magnitude of his tax.

[5] There were, to be sure, other market failures, where price interventions did not seem to work so well: zoning might be required to deal with the externalities associated with urban living, though zoning, like other forms of government intervention, had its problems as well.

[6] The most recent manifestation of this discussion is the debate over privatization. While there is a large literature discussing when there should be public provision of a good, there is very little analytic discussion of public production. See, for instance, Vickers and Yarrow [1988] and the Summer 1987 issue of the Journal of Policy Analysis and Management, in particular, the article by Sappington and Stiglitz, proving what they call the Fundamental Theorem of Privatization.

problems of incomplete markets, imperfect information, and the pervasiveness
of imperfect competition.

Of course, the distribution of income which emerged from the
competitive market may not be to a society's liking[7]. And this is where the
second Welfare Theorem enters.   It says that every Pareto efficient
allocation of resources can be attained by means of the market.   All the
government needs to do is to engage in some initial redistributions, and
then leave the rest to the market process.   It says, for instance, that
capitalism cannot be criticized on the grounds that it results in the
accumulation of too much wealth in the hands of too few individuals.   If you
don't like that particular outcome, simply impose redistributive taxes.   The
government does not have to take over firms; it does not have to nationalize
the basic industries.

The Second Fundamental Theorem of welfare economics has fundamental
implications for how we think about economic organization.   It says that we
can separate out issues of economic efficiency from issues of equity.
Economists need not concern themselves with value judgments; whatever the
government's distributive objectives, it implements these through initial

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[7] In this part of my discussion, I am being deliberately vague in the
use of terms like, "society's liking" or "common welfare" or "public
interest."   Society does not have preferences; individuals do.   As Arrow
[1951] has emphasized, there must be some way of going from individuals'
preferences to statements concerning society's, some way of aggregation.
Arrow showed that there was no such way which satisfied a certain minimal
set of properties which one would like a social welfare function to satisfy.

At a somewhat looser level, there is still a broad social consensus
about some attributes of society which are desirable-- a consensus to which,
admittedly, not everyone will subscribe.   For instance, were society to
leave 50 % of its citizens unemployed, there would be a view that "something
was wrong."

lump sum taxes and subsidies, and then leaves the market to work for itself.

The past quarter century has seen a closer examination of Adam Smith's invisible hand. The theoretical research has taken two different strands (reflecting two ideological strands within the profession, a point to which I shall return later.) The first has attempted to show that the economy is Pareto efficient under much more general conditions than those originally used by Arrow and Debreu. The second has attempted to show that there were assumptions in Arrow and Debreu's analysis which, while perhaps mentioned, did not receive the attention they deserved. These assumptions make the Theorems of limited relevance to modern industrial economies. In this view, Adam Smith's invisible hand may be invisible because, like the Emperor's new clothes, it simply isn't there; or if it is there, it is too palsied to be relied upon.

PART I.

Four Objections to The Invisible Hand:

Pareto Inefficiency of Market Economies

The Welfare Theorems are just that: theorems, the conclusions of which follow inevitably from the assumptions. The research of the last two decades has not detected any major flaws of logic. The Theorems stand, as I have said, as one of the triumphs of modern mathematical economics. The question is not the logical status of these propositions, but their empirical relevance, the inferences which we make concerning how society

should be organized and about the design of economic policy. These are, to be sure, matters of judgment.

The earlier analyses of market failures basically agreed with the underlying conception of the market economy that was reflected in the assumptions of the Welfare Theorems. I am not so convinced.[8]

Smith was undoubtedly right that individuals' pursuits of their private interests lead to social consequences which may be quite different from those they intended. But whether it leads to (Pareto) efficient outcomes is a far different manner.

A. Unemployment[9] [10]

The persistence and pervasiveness across countries of periodic episodes of high industrial unemployment should at least induce skepticism concerning the Smithian vision. Surely, the economy can do better than the widespread misery which afflicted the major industries economies in the Great Depression. Are Hoovervilles and unemployment queues manifestations of the Invisible Hand? Can't we do better than that!

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[8] I touch on several aspects of this below. See also Stiglitz (1989a).

[9] In many discussions of market failure, unemployment is not treated as a market failure in its own right, but rather as a consequence of some other market failure (e.g. imperfect information or incomplete markets).

[10] This section draws heavily on my joint work with Bruce Greenwald, to whom I am greatly indebted, in particular, Greenwald and Stiglitz (1986 and 1988).

Two Schools of Economics.

The importance attached to this phenomena of unemployment has lead to two distinct views of capitalism. One view, tracing its origins to Smith, has stressed the efficiency properties of capitalism. Unemployment was viewed as but a temporary aberration from a norm of a well functioning economy. It has emphasized its virtues, reflected in the Fundamental Theorem of Welfare Economics. It has provided the intellectual foundations for the ideological commitment to market economies.

The second strand, which can perhaps be traced by to Malthus, earned our discipline the name of the dismal science. It was concerned with unemployment which seemed endemic in capitalist economies.[11]

Little love was lost between the practitioners of these two sub-disciplines, who had such different conceptions of how capitalism functioned. They hurled epithets at each other; the micro-economists, adopting the Smithian view, charged the macro-economists, the latter day descendants of Malthus, with that most base of all academic crimes, ad hocery (and sometimes, even worse, inconsistency.) The other side responded in kind--irrelevance was the charge which perhaps stuck with greatest force.

Lest students be confused by the seeming schizophrenia within the profession, we offered different courses, taught by different faculty, on macro-economics and on micro-economics. The students' usual ability to compartmentalize their learning into neat categories, with little spillovers from one course to another, had a last found a use!

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[11]Malthus was also concerned with problems of over population, which will not detain us.

The two schools of thought are reflected in two styles of papers commonly found in the literature. Each begins, after a brief introduction, by writing down a simple model; one then proceeds to show that the market allocation is Pareto efficient, even though the standard Arrow Debreu assumptions do not hold; the others show that the economy is not Pareto efficient, even though all but one of the Arrow Debreu assumptions are valid, and the one assumption which is altered is one which is not very plausible.

The Neoclassical Synthesis

Adam Smith was right about the power of self interest and the profit motive. Publishers saw an incentive in packing these two disparate subjects between hard covers. One of Paul Samuelson's greatest strokes of genius was the invention of the Neoclassical Synthesis, which argued that once the Keynesian problems of unemployment were dealt with, the neoclassical world reigned supreme. This proposition was put forward with such clarity and such conviction that it became virtually universally subscribed to within the profession. But let us be quite clear about the epistemological basis of the Neoclassical Synthesis. It is not a deductive proposition: Samuelson did not formulate a general theory which explained unemployment, and from which it followed that the elimination of unemployment would lead to Pareto efficiency. He did not have an explanation of wage rigidities or the other factors that might lead to Keynesian unemployment. The neoclassical synthesis was put forward as a dogma, an article of faith. It was believed because we wanted to believe it.

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We wanted to believe it for two reasons. First, it meant that we did not have to throw out the accumulated wisdom concerning how markets lead to resource allocations, the insights into economics which a century and a half of social thinkers had brought to the subject.

And most of us also believed in the market system: the record based on attempts at alternatives has hardly made these alternatives inviting.

But on the face of it, it was an incredible hypothesis. To give an analogy: it would be like suggesting that individuals who are not in the hospital with a fever of 105 degrees must be in perfect health. We have learned from medicine that the study of pathology, of how the system behaves when all is not well, provides us with many insights into how the human system functions normally. So too, we should learn from the economic pathologies--the less developed economies in which more than three fourths of humanity lives and the periodic episodes of unemployment which plague the more developed countries--something about the functioning of capitalism.

To put it another way, it seems far more plausible to me that the economy is always slightly inefficient: it is only the extreme cases of inefficiency which can easily be detected. There is other evidence corroborating this view. Most of us are not in a position to judge whether General Motors is efficient; we simply do not know the technology of car production. We might think that we can do a better job than Roger Smith[12], but he would tell us that we are not fully aware of the difficulties of the job. The one aspect of technology which is relatively publicly available is the "tax technology"--the set of rules which determine the liabilities which individuals and firms must pay. These are summarized in a scant few

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[12] Chairman of the Board and Chief Operating Officer of General Motors.

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volumes, with a few more volumes of court interpretations. With this data we cannot test the much more general principle with which Smith was concerned, with whether the rational pursuit of self interest would lead to Pareto efficiency; but we can test the more limited hypothesis of whether market forces lead firms to behave in a (privately) efficient way. The resounding evidence is negative--if they learn, they learn with remarkable slowness. (See Stiglitz, 1973a, 1982b, 1983, for a discussion of these tax "paradoxes."[13])

A Digression on Methodology

The appropriateness of assumptions and the relevance of models to "real world" situations is inevitably a matter of debate. Models are not perfect reflections of reality. And it is not even clear how we measure the extent to which they depart. Closeness of fit may be one test--but in time series data, R^2 are typically high for almost any specification. Naive extrapolation models do almost as well--sometimes better--than more sophisticated models which are allegedly theoretically well specified. Today, indeed, the soundness of the theory behind the empirical testing is supposed to be an important element in persuading us concerning the

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[13] The literature on tax paradoxes shows that firms and individuals could take actions which reduce their tax liabilities--and had no further consequences. The most longstanding of these paradoxes is the dividend paradox: firms could, by buying back their shares rather than issuing dividends, substantially reduce the cumulative amount of corporate plus individual income taxes paid on income earned within corporations. Other paradoxes include the choice of LIFO versus FIFO accounting, the failure to use accelerated depreciation, and the use of stock options as part of the compensation schemes for senior management.

It is difficult to distinguish among alternative explanations of these paradoxes: (a) managers are irrational and/or do not take actions which maximize the welfare of their shareholders; (b) managers are rational, but they believe shareholders are irrational.

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plausibility of the results. That is why it is the fashion to begin applied

econometric papers with detailed discussions of theory. Unfortunately, much

of the theory is hardly worthy of the name--and I am not referring here to

mathematical niceties which may have been slipped over. Consider the

neoclassical investment theory.[14] Modigliani and Miller [1958] purported to

show that financial policy was irrelevant. Thus, the theoretical

specification precluded including the kinds of cash flow and balance sheet

variables that earlier studies (such as Meyer and Kuh, 1957) had established

to be relevant.[15] Yet that theory was indeed a special, and I would argue,

largely irrelevant theory (as useful as it was for the theoretical

development of the discipline): it required no bankruptcy, no information

asymmetries, no transactions costs, and no differential taxation of

dividends and interests, all assumptions which were far from the mark, and

whose implications drastically changed the theory. Financial variables

should have been included in the analysis.[16]

In the end, certain critical experiments are likely to be more

information than a general goodness of fit test. In the contest between

Newtonian mechanics and Einstein's relativity theory, no one proposed that

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[14] See, e.g. Jorgenson (1968) or Hall and Jorgenson (1969).

[15]It is worth noting that more recent studies, such as those by Hubbard
and his co-authors, reconfirm the importance of balance sheet and cash flow
variables.

[16]Another example are those studies of aggregate consumer behavior
which impose restrictions, derived from the analysis of utility maximization
behavior of single individuals. Imposing the restriction of the symmetry of
the Slutsky terms makes the empirical study theoretically sound--though
aggregate demand curves need not satisfy the Slutsky relationship (or the
other restrictions which are derived from individual behavior) See, e.g.
Mantel (1974).

the two should be compared on the basis of how well they did on every day data. Newtonian mechanics would have done at least as well as relativity. But there were critical experiments (in particular, the solar eclipse experiment of March 29, 1919 done by the Royal Astronomical Society of England in Northern Brazil): a predication of relativity theory, which distinguished it from the Newtonian mechanics.

Unemployment as the Critical Test of the Invisible Hand

The pervasiveness and persistence of unemployment is, in my mind, the most telling "critical experiment" which should lead to the rejection of the basic competitive equilibrium model which (depending on how you view it) either predicts or assumes full employment.

Economists, like other individuals, have developed a variety of ways of responding to facts with which they do not like to deal.[17] It is sometimes suggested, for instance, that the data may not really mean what they say. (Of course they don't, but while we may not be sure whether there was 20 or 22% or 30% unemployment in the industrial sector in 1933, we know it was large!)

The response which I find most peculiar is somewhat akin to Senator Aitken's response to how to deal with the unpleasantries facing the US as a result of the Vietnam war: how to withdraw with honor. His suggestion was that we should simply declare that we had won, and go home. So, too, those who want to believe in the Smithian vision: they simply declare that the

[17] This general phenomenon is sometimes called cognitive dissonance, a characteristic of human behavior which, with few exceptions, modern economics has systematically ignored, in spite of the strong evidence of its importance in the psychological literature. for an important exception, see Akerlof and Dickens.

unemployed are all voluntarily unemployed. We take it as a dogma within the profession that we do not ask how tastes are formed: they are treated as exogenous. Evidently, there are periodic shifts in the demand for leisure, no more explicable than other periodic shifts in tastes: why do consumers like yogurt and pizza today, goods for which there was little taste but fifty years ago. And who are we to question then how they spend their leisure: if it happens to be in job queues, why should we question that any more than we question how many hours they spend watching TV? [18]

As you can tell, I am not sympathetic with this view. Indeed, the macroeconomic evidence against the competitive paradigm is, by now, overwhelming. (See, for instance, Hall, 1988) and Greenwald and Stiglitz, 1988b.) It touches not only on the presence of unemployment, but also on movements in real wages, employment, output, etc.

I have been troubled--and puzzled--by the popularity of those macro- economic schools (new classical and real business cycle theory) which have been based on the competitive paradigm, and the corollary propositions that there is no unemployment, extreme views which, while restoring the generality of the Invisible Hand, Adam Smith, I am sure, would have looked upon with horror. I ask myself, would they view the world this way had they or their parents experienced a long episode of unemployment?

A part of the popularity of these views is a result of the ability of these models to reconcile macro-economics and micro-economics. I referred earlier to the schism in economics between the two branches of economics, and the associated two views of capitalism. The desire to resolve the

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[18]By the same token, other indicators of distress, such as suicide rates, which increase in recessions and depressions, would be taken as bringing us into a quite different discipline, that of sociology.

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intellectual tension was strong. We have already commented on the failure of the "neoclassical synthesis" to do so. This left two alternatives: making macro- like micro- ; or making micro- like macro.

The former approach had one strong advantage. Through the work of Arrow and Debreu and a host of other neo-classical economists, micro-economics had been formulated on a rigorous basis. (Never mind that it produced few testable propositions, or that the testable propositions which it offered were rejected![19]) It had just the right amount of mathematical difficulty and sophistication: easy enough to be mastered by a hard working student, difficult enough to present a challenge.

But the curious aspect of this intellectual episode is that these versions of the neo-classical model became adapted to macro-economics just as micro-economists were coming to look upon them with suspicion, as they realized that slight changes in its assumptions of perfect and costless information and complete markets dramatically altered the conclusions.[20]

Indeed, among the motivations for these reformulations of micro-economics was the development of theories which could be made consistent with macro-economic evidence.

At the same time, micro-theorists came to realize that the standard competitive model provided relatively few restrictions on market demand (e.g. consumption, savings, and labor supply) functions. Any set of excess demand functions satisfying Walras' Law could be shown to be consistent with rational utility maximizing individuals, given particular preferences and

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[19] See, for instance, the discussion of tax paradoxes above.

[20] For a survey of some of these results, see Stiglitz (1985).

endowments.[21]   Thus, macro-economists who took the methodological position that postulated aggregative behavior be _derived_ from rational utility maximizing behavior were not really insisting on rationality, but on much stronger--and generally unacceptable-- hypotheses, such as that it should be derived from rational utility maximizing behavior of a single, representative individual.   Indeed, many adherents of these views have put so much stress on the ability to _calculate_ the derived savings/consumption functions that they have been willing to postulate utility functions--such as those with constant absolute risk aversion--for which there is strong empirical evidence that they provide a bad description of the behavior of most individuals.[22]

B. Imperfect Information and Incomplete Markets

If, as I have argued, the persistence and pervasiveness of periodic episodes of unemployment provides the critical test of the conclusions of the standard competitive paradigm, we need to identify what are the precise properties of the standard competitive model which are wrong. Which of the assumptions have to be dropped to yield the macro-economic phenomena described in previous paragraphs? These remain unresolved questions. But among the suggestions that look promising are those which lay at least part

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[21]See, e.g. Debreu (1973), Mantel (1974), or Sonnenschein (1973).

[22]Thus, the constant absolute utility function (the exponential utility function) predicts that all individuals will hold the same portfolio of risky assets, and that the wealth elasticity of demand for risky assets is zero.   The fact that the utility function has other predictions--that consumption increases linearly with wealth--which are not so easy to reject does not make the utility function any more persuasive. A theory must be evaluated in terms of all of its (verifiable) predictions. A theory based on constant absolute risk aversion utility functions is simply a non-starter.

of the blame at the feet of imperfect and costly information and incomplete risk and futures markets.

Much work in the past fifteen years has been concerned with examining more precisely how imperfect information and incomplete markets affect the standard micro-economic results. We now know that they alter them in fundamental ways[23]; not only may they provide part of the explanation for unemployment, but they provide much of the explanation for many of the institutions we see in our society, institutions which otherwise are hard to explain (e.g. sharecropping, credit rationing, equity rationing, etc.). Standard results, such as the Law of the Single Price, do not hold. They explain why the simple model of price-governed economic behavior provides an inadequate description of market economies. Reputations and contracts play an equally important role, one not captured by the Arrow-Debreu model (see Stiglitz, 1989b).[24]

Most important for our purposes is the result that <u>in general, when risk markets are incomplete and information is imperfect, markets are not constrained Pareto optimal: the Invisible Hand does not work.</u> There exist market interventions, which respect the limitations on information and risk distribution opportunities, which can make everyone better off. (Greenwald and Stiglitz, 1986, 1988a)[25] [26] [27] [28]

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[23]See Stiglitz (1985) for a description of how the central standard results of competitive analysis are altered.

[24]The failure to recognize this provides part of the explanation for the failure of market socialism.

[25]There are other reasons that imperfect information is likely to lead to the invisible hand not being satisfied: imperfect information leads to imperfect competition (Scitovsky (1945, 1950), Diamond (1971a,b), Arrow (1958), Salop (1979), Stiglitz (1989b)). Perfect competition is an essential assumption in the standard proofs of the Fundamental Theorems of

Of course, imperfect information is pervasive in the economy. We know that different individuals differ in their abilities, but we cannot tell perfectly who is the more productive. We know that different investment opportunities will yield different returns, but we cannot be sure which will yield the highest. We know the some individuals are more accident prone than others, but we cannot tell for sure who is the most accident prone. We know that default probabilities differ among borrowers, but we cannot be sure about the default probability of any particular individual.

Risk markets are far from complete. Many of the important risks which we face are uninsurable.

Given the pervasiveness of imperfect information and incomplete markets, it would seem that the model that Greenwald and Stiglitz describe-- in which the invisible hand is, at best palsied--is far more relevant than

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Welfare Economics. See below for more on imperfect competition.

[26] I focus my discussion here on the first of the Fundamental Theorems of Welfare Economics. I shall come shortly to a discussion of the Second Fundamental Theorem. For now, we simply note that an essential assumption in the standard proofs of the second theorem is the convexity of the relevant preferences and technologies. Those convexity assumptions are not, in general, satisfied with imperfect information. See Arnott and Stiglitz (1988) and Radner and Stiglitz (1984) and below.

[27] Arnott and Stiglitz (1989) have provided a general taxonomy of the market failures associated with moral hazard, as well as an analysis of the use of Pigouvian corrective taxes in this context (Arnott and Stiglitz, 1986). They have illustrated the pervasiveness of these market failures by examining the inefficiency of implicit labor contracts (Arnott and Stiglitz, 1985).

[28] Since Stiglitz's (1972, 1982a) papers showing that stock market equilibrium will, in general, be constrained Pareto efficient, there has developed a vast literature on this subject. See, for instance, Geanakoplos, et.al., forthcoming.

For an application to labor markets--showing that the implicit contract between workers and their employers will not,in general, result in an efficient risk distribution (see Newbery and Stiglitz, 1987).

the model which Arrow and Debreu described, in which the invisible hand works perfectly. From this perspective, Arrow and Debreu's great achievement was not to prove a general result--it is a very special model indeed. But rather, it was to find those special and limiting conditions under which the Invisible Hand theorems hold. Their contribution can be seen as a negative contribution--as showing how limited Adam Smith's original conjecture was.

Let me try to describe the intuition behind our result, perhaps seen most clearly in the case of an adverse selection model, like Akerlof's Lemons model (1970), applied here to the labor market (Greenwald, 1986). Individuals have different qualities of labor; the market cannot distinguish who is good. Firms pay a wage corresponding to the average productivity; and the average productivity is a function of the wage. As the wage or price of a good which is a complement or substitute to leisure changes, individuals change their labor supply; this has no direct welfare effect, because of the envelope theorem: at the old wages and prices, individuals were choosing their labor supply to maximize their utility. As the wage increases, firms are worse off, consumers are better off, but this is simply a transfer effect: under the hypothesis of market clearing, the gains of one are equal to the losses of the other.[29] But an increase in the price, say, of alcohol has a direct externality effect. Assume that alcohol leads lower ability individuals not to show up for work as much, so that the quality mix of job applicants improves.[30] This improvement in the quality

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[29] In Greenwald and Stiglitz (1988b) we show how the analysis can be extended to the case where markets do not clear.

[30] We assume that neither the alcohol consumption, nor the absenteeism which is a consequence, can be observed by employers.

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mix acts as an _externality_; at any wage, employers gain. And it is easy to show that the gain to employers is sufficiently great that, were an output or profits tax imposed on them, it would more than pay for the subsidy required to lower the price of alcohol.

Criticisms of the Greenwald-Stiglitz Theorem

There have been two responses to this theorem by those who want to retain their faith in the invisible hand. The first recognizes the logical validity of the conclusions, but questions the empirical significance. How do we know that slight deviations from perfect information lead to any more than a slight deviation from Pareto optimality?

In a sense, we cannot be sure--but neither can we be sure that slight deviations do not cause large deviations from market efficiency. (Slight deviations in some of the informational assumptions have been shown to lead to marked deviations in the qualitative properties of equilibrium; epsilon search costs may lead to monopoly prices (Diamond, 1971a,b), price rigidities (Stiglitz, 1987c), price dispersion (Salop and Stiglitz, 1977) or non-existence of equilibrium (Salop and Stiglitz, 1982).[31]

Nor is there any evidence that the market has only a slight amount of imperfect information, or that risk markets are virtually complete. What the Greenwald Stiglitz theorem has done has been to remove the long standing presumption that markets are efficient, except for those well defined market failures--externalities, public goods, etc.--which we dealt with earlier. The Greenwald-Stiglitz conception of the market economy is fundamentally different from that of Arrow and Debreu: the latter is seen as a limiting,

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[31]For a survey, see Stiglitz (1989b).

but uninteresting case of the former. In the Greenwald-Stiglitz view, market failures, rather than appearing as isolated and easily correctable by government intervention, appear to be all-pervasive. Whether, and how, governments should intervene to correct these market failures is a question to which I turn later in this lecture.

The second line of defense of the invisible hand theorem has been to revert to the ideological position that "anything the government can do, the private sector can do at least as well." Thus, if we obtain a result that the government can institute a Pareto improvement, we must have--somehow-- introduced an artificial distinction between the information or transactions costs facing the public and private sectors. We have, so to speak, compared apples and oranges, or perhaps more aptly, caviar and shad roe. We have made an irrelevant comparison. This point is reinforced by the results of Prescott and Townsend (1984), who establish that the market economy with adverse selection or moral hazard is Pareto efficient. Never mind that they have failed to show what is wrong with the simple examples which we have constructed which show precisely how the government can improve welfare. They have established a general theorem, of which ours must(!) be a subcase.

In our work analyzing the efficiency of market economies, we have been particularly attentive to this criticism.[32] We have shown that this criticism is simply not valid. We have shown, for instance, how governments can, in the presence of imperfect risk markets, impose taxes on observable

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[32]This is true not only of my work with Bruce Greenwald, but also of my work with David Newbery, analyzing the efficiency of economies with imperfect risk markets (1981, 1985) (see also Stiglitz, 1982a), with Richard Arnott, analyzing the inefficiency of markets with moral hazard (1986, 1989), with Carl Shapiro, analyzing the inefficiency of markets with reputation effects (1984), and with Andrew Weiss, analyzing the inefficiency of markets with credit rationing (1981).

variables (like the level of investment), which result in Pareto improvements.[33][34] Similarly, Greenwald and Stiglitz (1986) and Arnott and Stiglitz (1986) observe that _if_ the private sector could observe the level of _consumption_ of each good and service[35] and the total level of purchases of insurance for each contingency by each individual, then, even though effort were unobservable, the market would be Pareto efficient; it would make insurance premia depend on these variables. But they argue that these variables are not realistically observable. On the other hand, the levels of _aggregate_ sales of various commodities (such as cigarettes) may be observable. (Essentially, sales on secondary markets are unobservable.) The government is in a unique position to impose taxes and subsidies on total sales. A private insurance firm might try to insist that those who purchase insurance from it also purchase cigarettes from it, at a higher

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[33] Thus, Newbery and Stiglitz (1985), in their model with no equity markets, show that Pareto improvements can be obtained even if there cannot be taxes and subsidies imposed on outputs. Note that unobservability (or verifiability) of outputs is only one of the reasons for the failure of equity markets to function. Moral hazard and adverse selection provide alternative explanations (see, e.g. Myers and Majluf [1984] or Greenwald, Stiglitz, and Weiss [1984]).

[34] Grossman and Grossman and Hart attempted to provide an alternative definition of efficiency, "social Nash Optimality" or "SNOP". Market economies, they showed, had the property of SNOP. This definition had the property that in the first period, the government took the level of interpersonal transfers in each state of nature from one individual to another as given, unaffected by government actions. But tax/subsidy policies in the first period could affect relative prices in the second (or later) period(s), and thus affect the level of transfers. Hence, SNOP provided an inaccurate description of the constraints facing the government in market economies. There is, by now, a consensus that SNOP does not constitute a re-establishment of the Invisible Hand theorem for incomplete markets. Indeed, it can be viewed as showing the strong kinds of constraints that the government would have had to have faced for the market economy to have been (constrained) Pareto efficient.

[35]Total labor supply, total borrowings and savings, etc. all have to be observable. See also Arnott and Stiglitz (1986).

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than market price (as it tries to simulate the effect of a government imposed cigarette tax). But it would find it difficult to stop individuals from buying cigarettes from others. And even if all insurance companies agreed on the level of "tax" to impose on cigarette consumption, and they took over the cigarette industry, they could not stop the entry of a new cigarette firm. The government has the power to prevent entry and to enforce taxes.[36] Prescott and Townsend, in their discussion of moral hazard, in effect focus on the case in which quantities purchased were observable, a case for which we had already established the optimality of market allocations.

Thus, there are some circumstances--beyond the Arrow Debreu model--in which the market economy is constrained Pareto efficient. By the time we published our 1986 paper, most of these special cases had been discovered. Unfortunately, in many cases, they represent the most easy cases to analyze. Thus, the lack of risk markets presents no problem if (i) there is only one commodity, so commodity taxation cannot affect relative prices (the case studied by Diamond (1967) in his classic paper[37]; or (ii) there is no need for a complete set of risk markets, for instance because all individuals are identical (in which case there is no role for markets to transfer risks), the case focused on by macro-economists using representative agent models; or (iii) because individuals are risk neutral, in which case risk is

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[36] The government's powers are, of course, limited. If there were not significant economies of scale in cigarette production, it could not stop bootlegging in cigarettes; the threat of black markets puts a limit on the magnitude of the taxes that can be imposed. But evidently, these taxes can be quite high without significant black market activity developing.

[37] Diamond made some other essential assumptions, such as no bankruptcy and multiplicative risk.

irrelevant. The point of our paper was to show precisely how special those cases were.

The government has powers that are different from those of the private sector (Stiglitz, 1989c). Our paper showed that there were a large variety of circumstances in which those powers could be used to achieve a Pareto improvement. Whether government would, or could, use those powers in this way is a question to which I return in the concluding section of this lecture.

C. Technological Change

An objection to the invisible hand theorem that is closely related to that presented in the previous section (incomplete markets and imperfect information) is that the model on which it is based assumes a fixed technology (or more accurately, changes in technology are exogenously determined.)[38] Technological change--the result of deliberate attempts by firms to develop new products and to reduce costs of production-- is one of the hallmarks, if not the hallmark of the twentieth century. Can one really believe that one has described well modern industrial countries without taking into account technological competition?

The processes by which technology is improved--learning and R & D--can be viewed as a special form of information acquisition, and, as in our earlier analysis of information, the fundamental theorems of welfare economics--the modern representations of the Invisible Hand--do not apply.

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[38]The same applies to information: the Arrow Debreu model does not assume perfect information, only that beliefs do not change endogenously within the model.

Technological change (whether it occurs as a result of explicit expenditures on R & D or as a result of learning by doing) gives rise to economies of scale. R & D expenditures are fixed, sunk costs. Industries where R & D is important will naturally, then, be imperfectly competitive. (Stiglitz, 1987a, 1988a).

This is not a new insight: Schumpeter argued this point forcefully several decades ago. But both Schumpeter and Smith might have been concerned with my raising questions concerning the invisible hand results: though neither used the notion of Pareto Efficiency, both thought that the spur to innovation was one of the main virtues of market competition.

They may have been right. Yet it is a view of competition which is not at all embraced by the Arrow-Debreu model of competitive market economies, and it is not embraced by the Fundamental Theorem of Welfare Economics, which has been taken to be the modern embodiment of Smith's conception of the invisible hand.

While Smith and Schumpeter may have been right in spirit (a point which we have emphasized, for instance, in Dasgupta and Stiglitz, 1980), they were clearly not correct in detail. Depending on the precise assumptions, patent races can result in excessive expenditures on R & D (Dasgupta and Stiglitz, 1980) or insufficient expenditures (Stiglitz, 1988a, Dasgupta and Stiglitz, 1988.)[39]

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[39]The use of the patent system as an institution for providing rewards for innovative activity is not just a happenstance. It has certain efficiency properties, given the limitations on information. It avoids the necessity of screening applicants for government grants: those who have confidence in their ability to do research better than others (and can convince others to provide the necessary capital) undertake the research. It is difficult if not impossible to measure "marginal contributions"--how much sooner an innovation becomes available as a result of the activity of a particular individual. It is possible to tell who is first, but not easy to

D. Human Nature

My final query concerning the Invisible Hand Theorem and the model on which (modern renditions of) it are based is perhaps more fundamental and philosophical. The Arrow-Debreu model is based on a particular conception of individual and group behavior. The previous sections have criticized particular assumptions, and have shown how reasonable modifications of those assumptions lead to quite different results. I now want to raise some questions about the appropriateness of that basic conception.

The Fundamental Theorem of Welfare Economics, like the invisible hand, makes use of each individual's pursuit of his own self interest. Whether individuals are rational or not, surely an individual's self interest is more "reliable" as a guide to action than other motives of human behavior. But while self interest is, undoubtedly, an important aspect of human behavior, it is not the only aspect which has a consistent and persistent effect on economic behavior.

In my Marschak lecture (1987b),[40] I referred to two other characteristics, human fallibility and human sociability. One of the benefits of growing older is the growing recognition of others' fallibility. It is not only that mistakes get made: differences in judgments are what makes life in organizations both so interesting and so difficult. (Human fallibility can be viewed as another aspect of imperfect information; but what is at issue is not just that individuals have

ascertain who "almost made it."

[40] This work was based on joint work with Raaj Sah (1985a, 1985b, 1986, 1987, 1988).

incomplete information, say, concerning any project, but they have limited abilities to process that information and limited capabilities to communicate information: in the process errors are inevitably introduced.

Human fallibility means that an organization's decision making structure makes a difference. It also makes a difference who--which particular individuals--have decision making powers, a subject which engrosses much of the time of those who have had the good fortune to assume decision making positions.

Note the marked contrast between the conception of market economies, and in particular the firms within those economies, embodied in the Arrow Debreu framework and that reflected in the Human Fallibility perspective. In the former, decision making is indeed a boring task: managers do nothing more than follow the textbook prescriptions of how to behave; they simply set marginal cost equal to price, and, to borrow Joan Robinson's phrase, they look up in the Book of Blueprints the appropriate page corresponding to current factor prices.

Human Sociability--the fact that individuals are social animals, and care about their relations with others--also plays an important role in determining economic behavior. For instance, there is convincing evidence that individuals' perceptions of whether they are fairly treated affects their work effort; fairness is largely a social concept--one compares one's wage with others in one's orbit of comparison. The recognition of this has important consequences both for levels of wages and distribution of wages within firms.[41] [42] [43]

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[41]See, e.g. Akerlof (1980, 1984). For an early articulation of what is known as the "morale" basis of efficiency wages, see Stiglitz (1973b, 1974a). For a general survey of efficiency wage theory, see Stiglitz

Two Problems with the Second Fundamental Theorem

We have come to recognize that the second Welfare Theorem, too, is plagued with difficulties, the two most important of which I will now briefly describe.

Absence of Lump Sum Taxes

The first is that the government cannot, and does not, rely on lump sum taxes as a basis of redistribution. This, too, can be viewed as a consequence of imperfect information: the government does not have the information available to decide who should (given society's ethical values) pay a lump sum tax, and who should receive a lump sum benefit. It must, accordingly, make its judgement based on observable characteristics, characteristics which, in almost all cases, are alterable, such as income. But basing redistributions on these variables necessarily introduces distortions. Individuals alter the alterable characteristics, to reduce the payments they make or to increase the payments they receive.[44]

(1987d).

[42]It has further consequences as well. Nalebuff and Stiglitz (1983) showed, for instance, that contests have major advantages, in providing strong incentives with limited risk bearing. Further, they allow for "incentive flexibility," an automatic adjustment

[43]Thus, Nalebuff and Stiglitz (1983) identify some distinct advantages of contests as incentive devices. The fact that they are not as extensively employed as the theory suggests is partially accounted for by sociological/psychological considerations.

[44]This has been the basis of the literature growing out of Mirrlees' (1971) seminal paper. The information interpretation of the tax-redistribution problem is contained in Stiglitz (1987c), who coins the term "the New New Welfare Economics" to distinguish between the Old New Welfare Economics, where equity and efficiency considerations were separated,

One of the central consequences of the Second Welfare Theorem was the ability to separate efficiency issues from distribution issues. In the absence of lump sum taxes, this separability is not possible.

Principal Agent Problems

One of the major advances of the economics of the past fifteen years is the recognition of the importance of incentive problems. Incentive problems do not arise, in an interesting way, in the traditional Arrow Debreu model, which forms the basis of the Fundamental Theorems of Welfare Economics: individuals perform in the contracted way, or they do not get paid.

The issue of providing incentives for workers is one of the central problems facing managers; the issue of suppliers of capital providing incentives to those to whom they have entrusted their funds, to use those funds wisely, is one of the major problems facing investors. Some would go so far as to say that the incentive issue is the central issue of economics.

Incentive issues arise, fundamentally, because some of the consequences of one's actions affect others: the employer is benefited if I work hard, the landlord is benefited if his sharecropper exerts greater effort.

We now understand why these problems arise, and what assumptions of the

standard Arrow Debreu model account for its unrealism in this dimension.[45] What concerns me here are its consequences for the Invisible Hand.

To see these most clearly, let me turn to the example which represented one of the earlier articulations of the principal agent problem--sharecropping (Stiglitz, 1974b). There had been a long tradition criticizing sharecropping as an inefficient social arrangement; because the worker typically had to pay a third or a half of his output to the landlord, his incentives were attenuated. Those who believed in the efficiency of market institutions found this a puzzle. What Stiglitz showed was that, given the limitations on risk markets, and given the limitations on landlords' abilities to monitor workers (or the costs of monitoring), sharecropping was an efficient institution.[46]

But it is an efficient institution given the distribution of wealth--given the disparity between endowments of labor and endowments of capital (land). The incentive problems associated with sharecropping simply would not arise if all tenants owned the land upon which they worked. A redistribution of land from landlords to peasants would probably not be a

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[45]Again, this problem can largely be viewed as a problem of imperfect information, the inability of the manager, say, to specify fully the actions to be undertaken by the worker, and of imperfect risk markets, the unwillingness of the worker to undertake contractual arrangements which would give him better incentives, but at the cost of greater risk bearing.

For an analysis of the profound consequences of moral hazard problems on the nature of competitive equilibrium, see Arnott and Stiglitz (1983, 1988a).

[46]Actually, he only showed that it was locally efficient, that is, the sharecropping contract was the solution to the problem of maximizing the expected utility of the landlord, given a particular expected utility of tenant-farmers. In general, the market equilibrium is not general equilibrium Pareto efficient, a result which follows as a corollary of the Greenwald-Stiglitz (1986) analysis.

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Pareto improvement: landlords would be worse off. But, to borrow a phrase from Smith's classic work, the Wealth of the Nation--the annual flow of output--would be increased, so long as the labor supply curve was not backward bending.

And because, as Greenwald and Stiglitz have shown, economies in which principal agent problems arise are almost never Pareto efficient, the inequality of land ownership means that the economy not only will not be maximizing national income, but also that it is, in fact, Pareto inefficient.

Once again, we see that we cannot separate out issues of distribution from efficiency.[47]

Part III.

Implications for Economic Organization

We care about the Invisible Hand, not only because of its inherent intellectual interest, but because it affects our views concerning how society should organize the production of its goods and services and our attitudes towards a wide range of government policies. In this section, I illustrate this with several examples.

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[47] Exactly the same result was obtained in the Shapiro-Stiglitz (1984) analysis of workers' incentives in industrial economies, with costly monitoring.

One of the results--one could almost state it as a corollary--of the Arrow Debreu/Fundamental Theorems of Welfare Economics perspective on economics is the Lange-Lerner-Taylor proposition concerning the equivalence between market socialist economies and capitalist economies. Anyone who has visited one of the so-called market socialist economies would suspect something is amiss; and indeed, the model provides neither a good depiction of the market socialist economies nor of modern capitalist economies.[48] Among the more important of these are two to which we have already called attention:

In the Lange-Lerner-Taylor paradigm of market socialism, managers are well brought-up dutiful servants of the state. They carry out their tasks of maximizing profits at the prices presented to them by the State, without need for incentives. Perhaps if the world were as simple as the model presented it, this might be a relevant possibility: the manager is little more than an engineer, looking up (as we have said) the relevant page in the book of blueprints. Presumably, it would be relatively inexpensive to monitor him.

But the complexities of decision making, wrought by the imperfections of information and the pervasiveness of human fallibility, particularly in environments where managers are responsible both for innovation and for responding to changing circumstances, make such a model of economic organization irrelevant for modern societies.

Economic organization matters. The extent of decentralization in society matters. Sah and I have spelled out a number of the ways in which it matters. Here, let me just illustrate the general principle: if

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[48]See Stiglitz (1989d) for a discussion of some of the relevant issues.

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decision making is centralized, and the person responsible for making decision making is competent, the economic organization may perform well; but if he is incompetent, it will perform badly. Centralization is like putting all of one's eggs in one basket: just as we now recognize the greater advantages of portfolio diversification in allocating one's wealth, so, too, there are great advantages of diversification in allocating decision making powers. We need only dwell a few minutes on the evils wrought in this century as a result of the concentration of power in the hands of a few individuals.

Part IV.

Economic Policy

The Invisible Hand touches upon almost every aspect of economic policy. Here, I shall have time to comment on only one aspect, anti-trust. A central assumption of the Fundamental Theorem of Welfare Economics is the existence of competition. Without competition, there is market failure-- monopolists will exploit consumers by producing too little, charging too high prices.

Traditional theory emphasized that, in the absence of government imposed barriers, markets would be competitive, except if there were increasing returns.

I referred earlier to a strand of literature which has been concerned with showing that the Invisible Hand theorem is, in fact, stronger than the earlier proofs might have lead one to believe. The analysis of the

consequences of natural monopoly provides perhaps the best illustration of this.

Following a long Chicago tradition (see, e.g. Demsetz, 1968), Baumol, Panzar, and Willig (1982) have put forth the view that all that is needed is potential competition, not actual competition to ensure that the invisible hand works effectively--that prices will be driven down to average costs and that economic efficiency will be attained.

As we put it on another occasion, this view, while it may be well funded, is not well founded (Dasgupta and Stiglitz, 1988). Of course, businesses who dominated a market found this idea attractive. Were it true, it would have profound implications: it would imply not only that anti-trust policy was unneeded, but attempts to break up monopolies might actually be welfare decreasing, since the smaller units could not take advantage of the economies of scale.

Elsewhere, we (Dasgupta and Stiglitz, 1988, Stiglitz, 1988a) have shown the contestability doctrine not to be robust: all it takes is an epsilon of sunk costs to act as an effective barrier to entry. Under some circumstances, profits may be bid away, but even then, prices remain at an economically inefficient level; profits are dissipated in excess entry. The point is a simple one: firm decisions to enter are based not on current prices, but on their judgments about what would happen to prices if they enter. If they think the incumbent firm will lower his price, then entry may be unattractive. And we have shown that, in equilibrium, under a variety of conditions, that is precisely what the incumbent will do. Of course, in the limiting case of no sunk costs, the entrant has nothing to lose: he enters for a second, and if the incumbent lowers his price, he

simply leaves. But there is hardly an industry in which there aren't some sunk costs (if only the sunk costs associated with learning about the industry), and in many cases they are substantial.

In the days before airline deregulation, airlines were held up as the example par excellence of an industry with no (sic) sunk costs. (Of course, if you want to make money, customers must know that you are flying; you must advertise, and those are sunk costs.) The post-deregulation era has provided convincing refutation of the contestability doctrine: at the very least, it cannot be taken as a general proposition. In market after market, prices have tumbled as entry occurred; as incumbents matched entrant's fares, customers chose the familiar brands; entrants were forced to leave; and prices were quickly restored to levels far higher than marginal costs. Potential competition simply did not suffice.[49]

As I remarked earlier, R & D involves fixed, sunk costs, and the discussion of potential competition thus has an immediate bearing on industrial sectors in which research places an important role. Potential competition does not ensure that the level of R & D expenditures will be socially efficient. Indeed, under some circumstances, a firm which has a technological leadership can behave almost as it would were it an unfettered monopolist: for it can establish a sufficient lead that competitors will credibly believe that, were they to enter, the incumbent would respond by

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[49]It has also been argued (Baumol, Bailey and Willig) that multi-product firms (say an unregulated utility) will charge the same structure of prices that the government would charge, were it faced with running the enterprise. Both would employ Ramsey-Boiteux prices. But there is only a superficial resemblance between the two. For example, unless the unregulated utility is protected against entry, he will take into account the supply responses of potential competitors, should he charge too high a price for some service. There are several other differences between the two. See Sappington and Stiglitz (1987b).

speeding up his research program. Given that, entrants have no incentive to
enter. (Dasgupta and Stiglitz, 1988, Stiglitz, 1988a). [50]

This poses the fundamental question: can we have much confidence in
the invisible hand working well in modern industrial economies? At this
juncture, any belief in the invisible hand must be taken as an article of
faith, not a scientifically established proposition.

Part V.

Ideology and the Invisible Hand

Economists want to believe in the invisible hand. Or at least many
American economists do. The quest for generalizing the invisible hand
theorem--an unsuccessful quest, in my view--has been a central focus of much
of the profession during recent decades. Results abound in the literature--
results which, upon closer examination, simply don't hold up.

Not all of this is motivated by ideology. Some of it is motivated by
fashion and academia's reward structure (the invisible hand at work again,
though now not necessarily promoting the general welfare): it may be
relatively easy to write a paper following the standard formula, which

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[50]This analysis also throws into doubt Schumpeter's views concerning
the effectiveness of competition as a driving force for innovation, and his
characterization of market economies as a succession of innovators.
   At the same time, I do not want to underestimate the importance of
competition as a stimulant for innovation: our objective here is only to
recognize its limits.

begins with a (very) brief introduction stating a limitation in previous writers' work, a model which is a slight modification of the well-accepted competitive model, and then the theorem: under the stipulated (often uninterpretable) conditions, market equilibrium is Pareto efficient.

And finally, some of it is motivated by "honest error." A natural research strategy is to begin with simple models, and then extend them by making them more complex. The natural simplifications employed to get easily tractable models turn out to be the special conditions under which markets are sometimes Pareto efficient.

Let me illustrate these quests for a Stronger Invisible Hand by three more examples (in addition to the Contestability example given in the preceding section).

Imperfect risk markets. When Arrow and Debreu originally proved their result, they assumed that there was a complete set of risk markets--a clearly unsatisfactory assumption. A natural question was, would the economy be efficient if there were fewer risk markets, say a stock market; or, more particularly, would the market be constrained Pareto efficient, taking into account the limited availability of risk markets. Diamond (1967) showed that it would be. But he found the (essentially) singular case where that result holds--there must be only one commodity. With two or more commodities, the market is constrained Pareto inefficient, except in the singular case where the two commodities are the same (or where all individuals are identical, so no risk markets are really needed [see Stiglitz, 1982a]).

Moral hazard. Following Stiglitz (1974b) and Ross (1973), principal agent problems have typically been characterized as the solution to a simple problem: maximize the utility of the principal subject to the agent receiving a particular level of expected utility. Shavell (1979) used this framework to analyze insurance markets, and to conclude that the market equilibrium is efficient. But this result too is terribly special--it requires, for instance, that there is a single good. (See Arnott and Stiglitz, 1989).

Real Business Cycles. The misleading nature of the earlier optimality results on moral hazard and incomplete markets discussed in the previous paragraphs is perhaps understandable: the single commodity assumption was a natural assumption to begin the analysis of an admittedly complex problem.

I am, however, far less sympathetic with the special nature of the optimality results reported in recent work in macro-economics. One of the central objectives of research in that area is to understand unemployment, its causes, its consequences, and how it varies over time. Little insight into that question is obtained by assuming market clearing--that there is no unemployment. Even if one claims little more than this is the first stage of a long term research programme, which eventually is aimed at contributing insights into this phenomenon, it seems a peculiar way to begin such a research programme.

Similarly, it should seem obvious that the consequences of unemployment--at least the social consequences--are far different than an

equi-percentage reduction in the hours worked by and the income of each individual.

Elsewhere, we have argued (Greenwald and Stiglitz, 1988b) that many of the central macro-economic phenomena can be traced to asymmetric information in labor, capital, and product markets. If that is the case, it makes little sense to begin macro-economic analysis with representative agent models, for in their very formulation they preclude most of the central problems of asymmetric information.

But even if one does not agree on the importance that we ascribe to asymmetric information, how can one, in good faith, use a representative agent model to conclude that the economy is efficient (the invisible hand) and that therefore government intervention is counter-efficient: true enough, the conclusions follow from the assumptions. But by now, we know how special those assumptions are, that with incomplete risk markets and imperfect information, markets are essentially never constrained Pareto efficient (except in singular cases, such as when all individuals are identical, when no trade would occur on markets for trading risks, were they to exist.)

We have also shown that market equilibrium with just a little bit of information can be markedly different from equilibrium with perfect information. Why, then, make a pretense of "theoretical rigor" for such models? The structures of theoretical rigor are imposed to add confidence in the conclusions of the analysis. But what confidence can we have, if we already know that the results are not robust to slight alterations in the assumptions?

A research programme, the objective of which is to show that the observed fluctuations in employment and output could be the outcome of shocks to technology in a perfectly competitive economy with perfect (or at least symmetric) information seems to be sufficiently flawed as to raise questions why it has been pursued with such enthusiasm: could it be that the policy conclusions of such a theory--that the outcomes of market processes that we observed, however peculiar and unattractive they might seem, are in fact efficient and that government action is unnecessary--satisfy some ideological programme?

Although real business cycle theory, and its cousin the new classical theory, claim to follow in the tradition of classical economics, they have gone far beyond what the classical economists (or Adam Smith) would have claimed. These economists did not claim that the economy instantaneously adjusted to full employment, only that there was a long run tendency for full employment. Pigou postulated a mechanism--the real balance effect-- which would restore the economy to full employment, but the mechanism was a slow one: even at the maximum rate at which prices fell during the Great Depression,[51] it would have taken more than a century for the economy to recover!

Concluding Remarks

The two hundred years since Adam Smith wrote his masterpiece has witnessed an unprecedented increase in living standards within capitalist

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[51]And even ignoring the Barro-Ricardo arguments suggesting that the elasticity of consumption with respect to changes in the real value of outstanding government bonds is much lower (perhaps zero) than the elasticity of consumption with respect to wealth in general.

economies. The fruits of this growth have, moreover, been widely distributed. I suspect that Smith would have been astonished at how effectively the invisible hand had worked, how well it had served to increase the wealth of nations.

But in the face of such achievements, he would, I think, have looked on at astonishment at those exaggerated claims --meant to be interpretations of his invisible hand conjecture--that the market economy was Nirvana on earth, that resources were always and instantaneously allocated in a (Pareto) efficient manner. Such exaggerated claims do a disservice, even to those who would like to see government play a very limited role in economic activity.

We now recognize that it is only under highly idealized circumstances that the market economy is constrained Pareto efficient. Some of the inefficiencies of the market economy are small, and some--like the periodic episodes of massive unemployment that have plagued capitalist economies during the past two century--are not so small. Whether, or how, democratic governments can best improve matters, and whether they are likely to do so, are questions which take us beyond the scope of this paper. When the central result of economics was that no government--no matter how well designed--could possibly improve upon market allocations, there was no need to enquire into these matters of political economy. There was a simple prescription: government activity should be limited to lump sum redistributions and correcting a well defined and limited set of market failures. But now that we see that market failures (in the sense of constrained Pareto efficiency) are pervasive, that they arise in all aspects of economic life, and that issues of efficiency and equity cannot be neatly

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separated, these issues of political economy cannot be ignored. But these issues--and not the issue of whether the market economy attains the ideal of Pareto Efficiency--are, or ought to be, the focus of debate and discussion in democratic societies.

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