

The Visible Hand

John Bryant

June 1980

Working Paper #155

PACS File #2660

NOT FOR DISTRIBUTION

A new approach to market behavior is suggested. This approach has a coherent game theoretic foundation, addresses such anomalous economic behaviors as strikes, rigid wages and unemployment, regulation of financial markets, depression, and nonmarket allocation, and, more generally, provides insights for Finance, Oligopoly Theory, Industrial Organization, and Macroeconomics. The central theme of the approach is that exchange technologies are a basic building block in a model, as are tastes, endowments, and production technologies. Moreover, the key feature of an institution of exchange is that it allows the making of a binding final offer.

To my correspondents: As of September 1980, my address is--Department of Economics, College of Business Administration, University of Florida, Gainesville, Florida 32611. Please send comments, questions, corrections, outraged objections, and other communications to that address.

The views expressed herein are solely those of the author and do not necessarily represent the views of the Federal Reserve Bank of Minneapolis or the Federal Reserve System. The material contained is of a preliminary nature, is circulated to stimulate discussion, and is not to be quoted without permission of the author.

The Visible Hand
by John Bryant

In this paper a radically new approach to market behavior is suggested. The potential advantages of this approach are two-fold. First, it may be the only approach with a coherent game theoretic foundation, and in models of limited information. Second, this approach may address such anomalous economic behaviors as strikes, rigid wages and cyclical unemployment, regulation of financial markets, depression, and nonmarket allocation, and, more generally, provide insights for Finance, Oligopoly Theory, Industrial Organization, and Macroeconomics. Indeed, as essentially all macroeconomic behavior is anomalous from the viewpoint of existing theory, else why the gulf between microeconomics and macroeconomics, a new approach seems essential. The magnitude of this need is only underlined by the highly complex and sophisticated models generated by those trying to close the gulf between microeconomics and macroeconomics.^{1/}

The classic bargaining problem of game theory is central to economics. An economy is a group of individuals engaged in exchange, and in any exchange the rent generated is allocated between trading partners. Therefore, exchange inherently involves a bargaining problem, the bargaining over the rents, the returns from exchange. Yet there is not a noncontroversial solution to the bargaining problem.

The Competitive Allocation

Economics "finesses" the bargaining problem by assuming that the competitive allocation is achieved in a bargaining situation. From a positive point of view this finesse is perfectly legitimate. However, to finesse the bargaining

^{1/}My recent sampling of automobile salespersons suggests that hard sell is the method of choice.

problem is at variance with the Utilitarian basis of modern economics. This finesse leaves the false impression that the resulting economic theory is based upon optimizing behavior. It leaves an unsatisfying gap between economics and a theory of choice. We want to know how agents get to the competitive allocation.

Much of the support for the choice of the competitive allocation has been theoretical, not empirical. Indeed, an economist need only accompany the spouse on a shopping trip to observe what are, from the competitive point of view, anomalies. These, and other, anomalies may not, of course, be important in the sense that for the relevant economic issues the competitive allocation is a good approximation. However, that macroeconomists are split on this very point shows that there is substantial doubt on this score.

The theoretical support of the competitive allocation is largely based upon the nice properties which it exhibits in very general settings. Indeed, perhaps the most elegant results in economics are those enumerating and proving the nice properties of competitive equilibrium. However, we are not concerned with whether heaven is competitive, but whether our economy does, or any economy can, generate the competitive allocation.

Apparently, the nice properties of competitive equilibrium are viewed as telling for one of two reasons. Either, (1) the unfettered market, free enterprise, generates the competitive allocation, or (2) agents, because of the nice properties of competitive equilibrium, structure the environment to generate the competitive allocation.

It is not at all clear that free enterprise is competitive. That the competitive allocation is not the unchallenged solution to the bargaining problem warns us immediately that it may not be the free enterprise solution. In this regard, elegant work has been done demonstrating that in some settings the core converges (in an appropriate sense) to the competitive allocation as the

number of agents grows (Hildenbrand [7]). Yet, it is not at all clear that one's model of "free enterprise" should involve a solution concept predicated upon an unlimited degree of collusion! The convergence of the core to competitive equilibrium does not support the argument that free enterprise generates the competitive allocation, but the argument that agents structure the environment to generate the competitive allocation.

However, the core itself is not a noncontroversial solution concept for the cooperative game. Moreover, the author has argued that the cooperative game itself is nonsensical, that the basic assumption in game theory of independent choice itself rules out such cooperation (Bryant [6]).

There is a defense for the position that free enterprise corresponds to the competitive model. Arrow and Debreu [1] produce competitive equilibrium as a Nash equilibrium of a noncooperative game with an additional fictional agent (the auctioneer) and ad hoc restrictions on allowable strategies. It remains to show that economic agents in a noncooperative super game can and do choose to restrict the environment in the manner Arrow and Debreu suggest. Moreover, from a positive point of view, this approach is suspect: In practice we do not observe the kind of massive interference in exchange mechanisms implied by replicating the Arrow-Debreu scheme. And whether such a scheme should be termed "free enterprise" is, of course, questionable.

It is, indeed, ironic if advocates of free enterprise are supporting their position with an appeal to a theoretical model invoking massive collusion or massive interference in the marketplace.

While the competitive allocation has nice properties, the most compelling criticism of the competitive allocation is the nice property which it lacks: incentive compatibility. Hurwicz [8] has shown that the competitive

model is not incentive compatible. In the Arrow-Debreu scheme Hurwicz demonstrates that agents have motive to deviate from the ad hoc restrictions on strategy sets if preference orderings are not known. Moreover, it is impossible to keep them from doing so for the simple reason that it is impossible to know that they have done so. Hurwicz's result raises the doubt that any "scheme" can be found such that the competitive allocation is the solution of the implied game of limited information.

However, from our point of view, perhaps the most damning flaw of the competitive allocation is that, even accepting it on its own grounds, it finesses the bargaining problem. The results on the convergence of the core in an economy with production depend upon technologies for which rents are, indeed, vanishing in the limit. The restrictions on technologies are defended as being reasonable (see Arrow and Hahn [2]). Perhaps so. But the ease of providing an inadmissible technology suggests otherwise. For example, suppose there are $2N$ individuals, each endowed with 1 unit of labor. There is a single consumption good which alone enters utility functions, and it does so positively. Each individual working alone can produce goods $1-1$ with labor. Acting in pairs, individuals can produce goods $2-1$ with labor. These are the only production possibilities. Independent of N , any individual has as unblocked allocations the interval $[1,3]$. Suppose there are $2N+1$ individuals. Then any individual has as unblocked allocation $[1]$, which converges trivially. But who gets the surplus $2N$ goods, the aggregate rent? In the Arrow-Debreu scheme rents from joint production are allocated by a previously determined distribution of shares in the productive activities. But how is the distribution of shares determined? This is the crux of the problem of exchange! This competitive model has swept the crux of the problem under the rug. The essence of economics is put beyond the purview of economics.

Given the preceding discussion of the competitive allocation, it should come as no surprise that the author has an alternative approach to exchange. In an earlier paper, some particular bargaining problems of specialization and trade with limited information generated potentially interesting results (Bryant [6]).

Briefly, the major results generated are: (a) enforceable contracts do not generate exchange, (b) the ability of an agent to make a binding final offer does generate exchange, and (c) the offer tenderer extracts the rent from an exchange, unless the market structure is "competitive," in which case the trading partner gets the rent.

Below, these results are explained and discussed in some detail. Then it is hypothesized that these results hold generally. Most importantly, we hypothesize that in practice the ability to make a final offer is necessary for exchange to take place. Possible implications of this hypothesis for some anomalous economic behaviors are drawn. Some of the anomalous economic behaviors considered are strikes, rigid wages and cyclical unemployment, regulation of financial markets, the Great Depression, and nonmarket allocation of goods and services.

The major message we draw is that our institutions of exchange are vital, not incidental. Exchange technologies are as important an element in an economic model as are tastes, and endowments and/or production technologies. This is a very different way of looking at the economy than that to which economists have become accustomed.

The Allocation of Rents

The allocation of rents presents a severe problem for exchange. Exchange, and the coincident specialization, occur for the purpose of generating

rents, for generating a higher return than individuals can achieve acting alone. Exchange can only occur if the allocation of rents to participants is determined, as the exchange itself allocates rent.

The ability to make binding agreements, while crucial to exchange, does not itself allocate rent, and therefore is not sufficient for exchange. By "free market" or "free enterprise" it seemingly is meant that the only governmental interference is a court system which enforces contracts. This leaves open the question of how traders allocate rents in their contracts. In a free enterprise system, how can the miracle of exchange and specialization occur?

The Final Offer Allocation

First, we turn to a description of previous results. The ability of a trader to be the first in making a binding final offer can engender exchange. In a particular setting with limited information, the author has examined the final offer as a means to allocate rents (Bryant [6]). Readers are referred to that paper for a detailed description of the setting and derivation of the results given below. It is found that, in most circumstances, the individual rendering the final offer (the dominant player) extracts almost the entire rent.^{2/} The dominant player faces the trading partner with a simple maximization problem. The solution strategy of the dominant player is to make an offer just dominating no exchange for the trading partner. This way the dominant player, not knowing the trading partner's preference ordering, can ensure that the exchange occurs.

However, if the dominant player is in a competitive market structure vis-a-vis other dominant players, then the trading partner gets almost the entire rent from exchange. By market, a term we use somewhat loosely in this paper, we

^{2/} If there is a continuum of strategies, then there may be only ϵ -optimal strategies for the dominant player.

mean a set of individuals considering an exchange of two goods. Competition in a market, as we define it, is not determined by the number of potential traders on a side of the market, as long as there are more than one. A market has a competitive structure if the dominant players (plural) are on one side of the market, and they all must make their final offers before any individual on the other side can accept an offer.

A competitively dominant player offers the whole set of contracts which make herself just better off than no trade. This minimizes the chance of being undercut by another dominant player. The competitively dominant player does not just offer the simple contract which guarantees herself minimal dominance, as she knows her own preference ordering. Therefore, it is better to face competitive trading partners than to be noncompetitively dominant. As a noncompetitively dominant player, an individual offers a contract which dominates no trade for the trading partner. Therefore an individual prefers a technology of soliciting bids to one of making her own final offer. The individuals on the other side of the market are indifferent.

An exception occurs if the dominated side of the market is offering a good (or factor) which is not scarce relative to the good on the competitively dominant side of the market. In this circumstance the dominant side still gets the rent. Suppose, for example, that not all labor can be usefully employed in the (capital using) industrial sector of an economy. From the Marxist point of view, there is a reserve army of the unemployed. Then the owners of nonhuman inputs get the entire rent, even if they bid competitively. Insofar as immigration officials and Cesar Chavez are ineffectual, this may apply to U.S. agriculture.

It does seem likely, however, that exchange typically is between goods or factors which are scarce.

By the above definition of competitive structure, we see that only one side of a market can be competitive. Moreover, the binding final offer allocation, in both competitive and noncompetitive forms, has one group getting almost the entire rent from exchange. Someone(s) always acts as monopolist. In particular, there is no oligopoly. More accurately, an oligopolist acts as a monopolist or as a competitor. As oligopoly theory is not well developed, its loss is, if anything, a relief.

In the particular setting studied, a final offer technology has a stability property. If one party makes a final offer and the other party subsequently learns how to "definalize" it, she does not do so. "Definalization" of a final offer just generates the no trade outcome, which is strictly Pareto inferior to the existing exchange. A dominated player will "definalize" a final offer only if she can (or thinks she can) turn around and make a final, truly final, offer herself.

This completes the description of previous results.

Binding Final Offer Necessary for Exchange

We now hypothesize that free market exchange occurs only when a party can (or must) make a binding final offer, and this generates the binding offer allocation with the above described properties. By free market exchange, we mean that the only outside interference is the enforcement of agreements.

Not only are we hypothesizing that the above-described results generalize to all settings, or at least all real world settings, but that the final offer is necessary as well as sufficient for exchange. Both these positive propositions are difficult, if not inherently impossible, to prove. Ultimately, as with any hypothesis, proven or otherwise, the test is whether it generates validified restrictions on observable variables. Certainly we are not at this

stage ready for this ultimate test. In the remainder of the paper we will consider some possible implications of this hypothesis on exchange for the economy, and suggest insights which it may provide on some anomalous economic behavior. The hope is to convince the reader that this approach has potential and is worth pursuing.

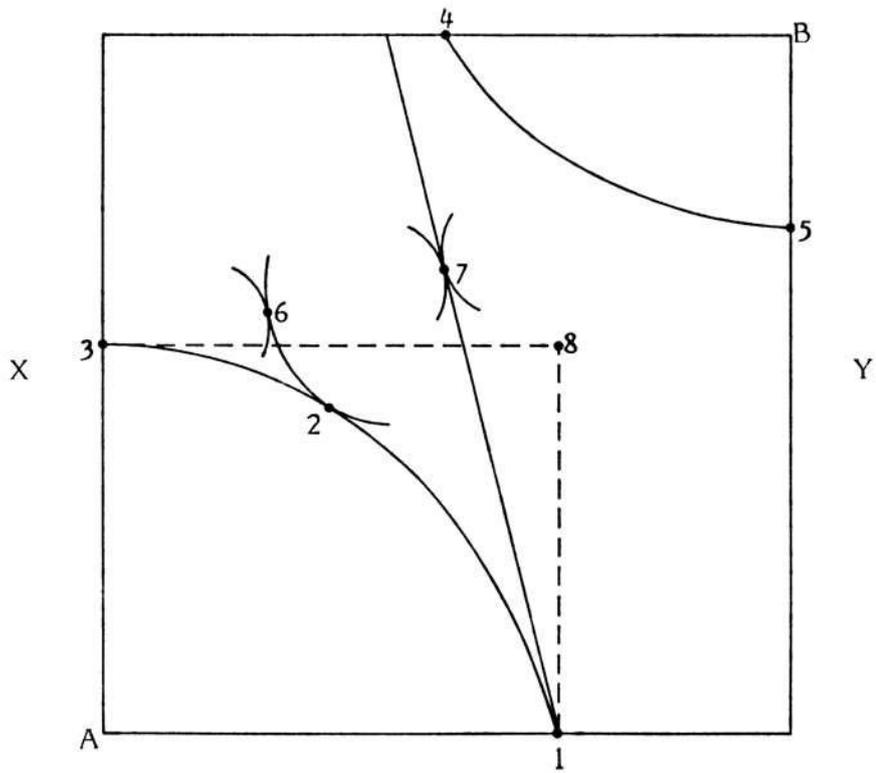
An Illustrative Example

Perhaps a simple example will help distinguish the different allocations. Consider two individuals, A and B, and two goods, X and Y. Suppose by pooling their endowments A and B produce a total of one unit each of X and Y, and this is the only possible pooled activity. Figure 1 is an Edgeworth box illustrating the rest of our example. Individual A, acting on her own, has production possibility curve 1, 2, 3, with 2 her preferred point and 1 her endowment. Individual B has her production possibility curve 4, 5, with 4 her endowment.

Now we consider our various allocations. First, suppose individual B is noncompetitively dominant. If individual B knows the curve 1, 2, 3, but not the location of 2, an ϵ -optimal solution is just northeast of point 8. If B does know the location of 2 (as assumed in Bryant [6]), an ϵ -optimal policy is just northeast of point 2. Now suppose there are two or more individuals like individual A and they are competitively dominant. Then an ϵ -optimal solution is just northeast of 6. The last allocation we have to consider is the competitive allocation. Assuming that individual B is the sole owner of the joint production technology (ownership determined how?), the competitive allocation is point 7.

It is worth noting that if the transaction technology had individual B as a noncompetitively dominant player offering the whole set of contracts which she finds just preferable to (8) or (2), respectively, then all the allocations are Pareto optimal. Individual B still prefers individual A being competitively dominant to being noncompetitively dominant herself.

Figure 1: Alternative Allocations



No Exchange

First, we consider the hypothesis that if there is no technology for a party making a binding final offer, exchange does not occur. Obvious examples of failure of exchange are provided by small buildings in the heart of a downtown surrounded by skyscrapers. Strikes, too, may just be times when neither party can make a final offer and there is rent to be allocated. Whether true or not, the collapse of northern Michigan copper mining has, for example, been attributed to the inability of labor and management to reach accord.

Usually, of course, strikes do end and exchange starts. This behavior of intermittent exchange can be explained in our approach by nonexchange exhausting rents. For example, if during a strike a firm loses customer loyalty or labor incurs the cost of being mobile, the strike ends when there is no more rent to be allocated. Therefore, our proposed model of strikes is that they exhaust the rent of a market.

Note that in our interpretation of strikes, permanent or intermittent, neither side is guilty of intransigence or stupidity. Both are victims of being in a game with a Pareto inferior no exchange solution. Explaining such anomalies as resulting from rational behavior is, of course, in the spirit of standard economic analysis.

This discussion suggests that exchange is tenuous, but in practice exchange seems robust. Indeed, failures of exchange are rare enough to be viewed as anomalies by the economics profession. However, our approach may be able to address the seeming robustness of exchange.

That the ability to make (or solicit) a final offer allows one to extract rent gives ample motivation for the search for technologies of final offer, for the formation of institutions of exchange. That, as discussed above, the first to achieve the final offer ability is likely to go unchallenged both

increases the return to generating institutions of exchange and increases the stability of such institutions. For a specific example, suppose forming a union allows workers to make themselves a scarce factor by inhibiting mobility, and to challenge the firm's final offer capability. If this action promises only labor strife exhausting all rent, workers do not form the union. Only if the union also gains the "jump" in making (or soliciting) a binding final offer does the union form.

The observed robustness of exchange may also be in part illusory. We observe exchanges that start or stop occurring. But we do not usually make observation of exchanges that never occur only because of the inability to allocate rents.

A Simple Model of Strikes and Competition

To give more substance to our discussion of strikes and competition, let us consider a simple model with our solution concept imposed. There are $n(N+1)$ individuals, $n, N > 1$. All individuals are born at time 0 and die at time $T, T > 1$. There is a single consumption good which is the sole argument of individuals' utility functions, and it enters positively throughout. Individuals do not care when in their lifetime they consume, just the total consumption matters. There are n production sites, and each is owned by an individual (the owner) who is endowed with nothing else. At each site N other individuals (laborers) are born, and they are endowed with labor alone. If a laborer works on her own for a measurable subset of time $V \subset [0, T]$, she produces the consumption good in amount $\int_V dv$ where v is normal linear measure. If she works on a production site continuously over an interval $[t_0, t_1] \subset [0, T]$, she produces $(t_1 - t_0)^2$ units of the consumption good. Moreover, this on site technology is the same no matter the number of laborers working at a given site. Therefore, if a laborer works on her own her entire life, she produces T ; and if she works on site

her entire life, she produces T^2 . Movement of laborers between sites is feasible, but for each laborer it requires a labor input for a total elapsed time of $t^C < T - \sqrt{T}$.

Before we can determine the solution in our model, we must specify the crucial attributes of the final offer technology. First, suppose that both owners and laborers can make a final offer, but neither side has the "jump." Then no agreement can be reached and individuals work on their own, "strike," until time $t = T-1$. For the last unit of time laborers work at the sites and get their entire product. But their entire product is still T , the amount it would be without use of the sites, and the strike has exhausted all the rent from use of the sites.

Second, suppose workers can restrict themselves to accept no owner offers until all offers have been made. Laborers now spend $[0, t^C]$ on strike, but rather than producing on their own, they use the time to generate mobility. At time t^C all laborers are mobile and are in a market in which production sites are competitive. Then laborers work at the sites for $[t^C, T]$ and extract the entire rent. Laborers get the entire product $(T-t^C)^2$. The strike exhausts the rent from location, but not from site use.

Third, suppose it is owners who can solicit offers from laborers, and then choose. The sites are not scarce, and the laborers offer the owners nothing. Laborers work at the sites the full time and get T^2 .

Fourth, and lastly, consider the case of noncompetitive dominance. Laborers (owners) can sequentially make final offers before owners (laborers) can, and owners (laborers) can accept those offers as made. The laborers (owners) get the entire rent and work occurs at the sites continually.

It is worth noting that with minor modification this model generates rigid wages and "cyclical" unemployment. For simplicity let us suppose that only

on site production is possible, and $T = 1$. Moreover, sites have a limited capacity, at most K (a natural number) units of the consumption good can be produced at each site. Laborers are noncompetitively dominant. If $K < N$, then nK laborers work and get 1 unit of the consumption good each, and the other laborers and owners get nothing. If K varies over time, so does output and unemployment for $K < N$. Moreover, output is bounded above by nN , so this model produces an asymmetric "business cycle" if, for example, K follows a random walk. Notice that unless they can become competitively dominated or noncompetitively dominant, unemployed laborers and owners have no reason to upset the system.

Technologies of Binding Final Offers

To understand the implications of the technologies of final offer for exchange, it would seem important to know what such technologies are. As economics has taken institutions of exchange for granted, relatively little has been done specifically studying existing institutions. If our approach is correct, rigorous study of institutions of exchange should have a high priority, with the binding final offer function providing the focus for analysis.

On casual observation, there seems to be one common technology of final offer found in institutions of exchange. The dominant player leaves the "store" in the hands of a representative with no power to bargain. An obvious example is provided by star athletes who disappear without a trace during contract negotiations, leaving their lawyer behind. Typically, this is attributed to the flakiness of the Prima Donna. We attribute it to the rents generated by Prima Donnas. Of course, retail stores typically use this technology of final offer: you cannot bargain with a sales clerk!

A less obvious, but important, example of this final offer technology may be provided by securities and commodities exchanges. In such exchanges there

are fixed procedures which brokers and floor traders follow in determining prices and spreads, and these are not negotiable. Occasionally, individuals do attempt to "corner a market" to extract rent in a manner that the exchange's procedures are designed to avoid.

Who Generates Institutions of Exchange?

One important question for the analysis of technologies of final offers is the mechanism determining what party sets up the technology and gathers the rent. What determines which partner in a trade can make a final offer or solicit bids? Or does the "middle man," the representative, set up the exchange institution and extract the rent from the trade?

One possibility is that as an economy advances, institutions of exchange are set up when the (discounted sum of) rents to be collected reaches the (discounted sum of) costs of such institutions. This model of institutions of exchange in free enterprise is that they just exhaust rent. Therefore, in this view of free enterprise, rents are not collected, are exhausted by strikes, or are exhausted by the institutions of exchange.

In some cases, the endowments and technology of production may give one side a natural advantage in generating the institution of exchange. Suppose for one side of the market the costs of setting up institutions of exchange exceed the rent, while for the other they fall short of the rent. Then the latter group sets up the institutions of exchange, and collects the difference between the rent collected and the costs. For example, a retail outlet can take advantage of scale technologies in sales, while for individual purchasers it is difficult to do so.

Of course, the discovery of exchange technologies may be the product of entrepreneurial skills, skills which can be treated like any other factor. This is, of course, a standard "dodge" in economics for handling rents. Without a

model of how rents from activities involving entrepreneurial skills are allocated, it is, of course, only a dodge.

In some cases, the holder of skills (or goods) may be able to extract the rent by not exchanging them, but instead by using them herself. This may explain why there are self-employed entrepreneurs, and why they seem to do better than hired individuals. Of course, the very existence of such entrepreneurs is anomalous for standard analysis, as they obviously do not hold a diversified portfolio. Entrepreneurs extract the rent from their skills. In contrast, hired individuals may not get that rent, instead the institution of exchange absorbs, or the employer extracts, the rent. It may also be that hired managers do not use entrepreneurial skills, as the rent from such skills cannot be allocated and their exchange does not occur for lack of a final offer capability.

This analysis may, in part, explain the old adage that it takes money to make money. Rent from skills is limited by the size of the activity one engages in, which is limited by one's assets if one cannot trade one's skill. This, in turn, may help explain the pattern of individuals working for another before branching out on their own. The chef who gets her own restaurant is an obvious example. The individual works for someone else to build her wealth, human and nonhuman, to the point where it is large enough to generate sufficient rent.

These observations on nonexchange opportunities may also have implications for Industrial Organization. Why some allocations are determined within firms by nonmarket means and some in markets is an important open question in Industrial Organization. And it is an open question in IO because nonmarket allocation is anomalous in standard economic analysis.

Perhaps costs of, or impossibility of, allocation of rents can give us a handle on this question of nonmarket allocation. Proprietary rights are

necessary for rents, and therefore for a problem in allocating rents. We hypothesize that nonmarket allocations avoid the assignment of proprietary rights, and thereby avoid problems in allocating rents. Therefore, we predict that nonmarket allocation schemes are observed when no proprietary rights inherent to individual endowments are involved, and when costs of such nonmarket schemes are less than the costs of allocating rents. Nonmarket allocations avoid the unnecessary proliferation of proprietary rights. For example, there is no need for workers at different points on an assembly line to have proprietary rights to their particular activity, but only to their labor services. Having such rights complicates the allocation of rents.

Governmental Institutions of Exchange

One final mechanism for allocating rents from exchange, which violates our assumption of free enterprise, is that the institution of exchange is imposed by a beneficent outsider. If the natural institution of exchange is not costly enough, and no group has the "jump" in setting one up, our free enterprise solution is no trade. Competition between exchange institutions cannot yield a solution, as this just moves the game of allocating rents back one step. If union and management cannot agree on a contract, they cannot agree on an arbitrator! In this circumstance a government can impose an institution of exchange and thereby improve welfare. For example, we suggest that offering arbitration services cannot solve a strike, but imposed arbitration can!

This imposed solution begs the question of how the political system can allocate rents which the economy cannot. For a consideration of this point in particular settings, see Bryant [4, 5].

Suppose the government does set up a monopoly institution of exchange, and then turns it over to private individuals to manage. Unless the government wishes these individuals to extract the rent, it must regulate their activities. Our banking system may be an example of such an imposed regulated "middle man."

We now turn to some possible implications of this interpretation of the banking system for depression. Banks act as "middle men" between borrowers and lenders. The regulations imposed on banks serve to determine what they offer to the partners in these exchanges, and thereby allocate rents. The omnipresent regulation of banks may have one of two explanations: First, the lack of an endogenous technology of final offer in the markets serviced by banks. Second, the general political power of individuals that would get none of the rent under free enterprise banking.

The first explanation for bank regulation implies that the concern over bank profits is justified, and is not, for example, just an excuse for government subsidy of a function better left to the private economy. For if banks are regulated, then their return is regulated. If inappropriately regulated, banks can collapse, and we then get the free enterprise, no trade solution. Indeed, this may be a description of the Great Depression of the 1930s.

The second explanation for bank regulation, political power of those who thereby extract rents, also is consistent with the Great Depression. Once again, the story is of imperfect regulation allowing the collapse of banking when the economy nose dived. The existing regulations then inhibited the free enterprise exchange institutions from developing following the banking system collapse. Regulation, instead of imposing a different allocation of rents, imposed the no exchange solution.

It is worth noting as an aside that this possibility of collapse distinguishes the stock market from the banking system. When the stock market "crashed" in 1929, it was not the institution of exchange which collapsed, but prices. The institution itself had no significant net position in the market which would cause its collapse. However, banks were constrained to issue deposits rather than shares, and therefore had a net position. The banking

system itself collapsed in the 1930s, leaving the private economy incapable of engaging in the trade previously carried on via the banking system. We entered a permanent, Pareto inferior strike.

Securities and commodities exchanges also are regulated to a certain extent, and therefore are examples of government interference in the institutions of exchange, although to a lesser degree than is the banking system. Once again, it is unclear whether this interference is designed to reallocate rents or to ensure the viability of these institutions of exchange.

Concluding Remarks

Institutions of exchange determine whether exchange occurs, and determine the allocation of rent from exchange. Indeed, technologies of exchange are basic building blocks in a model, like tastes, endowments, and production technologies. We hypothesize that the crucial element in any institution of exchange is that it allows, or forces, a party to make a binding final offer. This approach to institutions of exchange has provided potentially valuable insights into several anomalous economic behaviors, even in this preliminary, casual perusal of possible implications. Final evaluation of this new approach must await careful, rigorous analysis of existing institutions of exchange, an analysis which is in its infancy. At the least we should gain insight into how the competitive allocation is achieved under free enterprise. But my bet is that competitive equilibrium must be abandoned.

References

- [1] Arrow, K., and G. Debreu, "Existence of an Equilibrium for a Competitive Economy," Econometrica 22, 1954, 265-290.
- [2] Arrow, K., and F. Hahn, General Competitive Analysis, San Francisco, Holden-Day, 1971.
- [3] Bryant, J., "Competitive Equilibrium With Price Setting Firms and Stochastic Demand," International Economic Review 21, 1980.
- [4] _____, "The Competitive Provision of Fiat Money," Staff Report #48, Federal Reserve Bank of Minneapolis, 1979.
- [5] _____, "The Political Economy of Overlapping Generations," Staff Report #43, Federal Reserve Bank of Minneapolis, 1979.
- [6] _____, "Games and Economics: A General Solution and Particular Applications," Staff Report #57, Federal Reserve Bank of Minneapolis, 1980.
- [7] Hildenbrand, W., "On Economies With Many Agents," Journal of Economic Theory 2, 1970, 161-188.
- [8] Hurwicz, L., "On Informationally Decentralized Systems," in C. B. McGuire and Roy Radner (eds), Decision and Organization, Amsterdam, North-Holland, 1972.