THE OPTIMAL ROLE OF THE GOVERNMENT IN A COMPETITIVE EQUILIBRIUM WITH TRANSACTION COSTS

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Section 1 of this paper presents a positive theory of general equilibrium in a competitive economy which includes transaction costs. Paretian optimality conditions are specified in Section 2. Section 3 describes a Pareto optimal government policy for an economy in full competitive equilibrium. This description of the optimal role of the government for any competitive equilibrium with transaction costs is the central theoretical result of the paper. In its optimal role, the government (1) alters the legal system or applies taxes and subsidies whenever such alterations reduce aggregate transaction costs for a given set of real transactions and (2) engages in production whenever such production is profitable in real terms. The efficient government never otherwise alters a competitive private goods equilibrium. Section 4 specifies two applications. The theorem suggests that democratic governments should be constitutionally prevented from disturbing any private goods competitive equilibrium with specific taxes or subsidies on particular commodities except when the effect is to reduce transaction costs for a given set of real transactions. The theorem also demonstrates the Pareto optimality of relatively laissez faire financial system.

In Section 1 it is also shown that whenever there are positive private costs of acquiring initial rights to private property, uncontrolled rational individuals will devote more resources to the initial acquisition of property (which would otherwise benefit other individuals) than is socially optimal and will convert more initially common property into private property than is socially optimal. While the rest of the analysis assumes that all property is initially owned by someone and no property is jointly owned, the result suggests a third role of the government in establishing certain property as common property run by the government or in taxing the acquisition of previously common property. The result also reinforces a suggestion of the central theorem (that democratic governments be constitutionally prevented from disturbing any private goods competitive equilibrium with taxes or subsidies on particular commodities other than disturbances which reduce the total cost of a given set of transactions). It suggests that if a government permits majority rule to tax-subsidize in any redistributional fashion, it will induce individuals to over-devote real resources to the political process in search of redistributions, leading them to compete their net marginal private gains down to insignificant levels while their gross marginal cost, the marginal social loss in terms of foregone real output, remains a significant net cost to the economy.[1]

Since the first draft of this paper was narrowly circulated in 1968, several other

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[1] This does not rule out government produced charity according to the standard benefit cost criteria mentioned above. That is, it does not rule out redistributions which satisfy a Pareto condition given the initial, constitutionally determined distribution of property (Thompson 1967).

authors (Foley, Hahn, and Kurz) have independently derived theorems similar in formal structure to our central optimality theorem. However, our discussion of the optimal role of the government, by recognizing the informational basis of transaction costs, differs substantially from that found in the existing literature.

1. THE ECONOMIC THEORY APPROPRIATE TO AN ECONOMY WITH UNAVOIDABLE TRANSACTION COSTS AND THE ASSUMPTIONS OF OUR ANALYSIS

A. The Meaning of Transaction Costs

A transaction or exchange is defined as any transfer of property rights between individuals. Transaction costs are the sum of contract, search and bargaining costs. (The costs of an individual's computing his optimal behavior are assumed to be identically zero.) Contract costs are the joint losses to transacting individuals which result from the initial lack of perfect information regarding both the existence and nature of the exchange agreement and the performance of the parties according to the agreement. These include legal fees, court battles, and joint surplus losses resulting from the prohibitive costs of inserting or enforcing certain conditions in an exchange. Search costs are the joint losses to society which result from the lack of initial information on the part of some individuals concerning the available exchange offers in the economy. These include advertising costs, shopping costs, and surplus losses due to an individual's rational failure to discover better exchange offers. Bargaining costs are the joint losses to transacting individuals resulting from the lack of initial information concerning the terms of an actual exchange and include the costs of discovering a trading partner's true reservation prices and of making prior commitments regarding viable trading prices.

We shall assume a competitive general equilibrium so that market prices for each particular kind of good are costlessly known and constant to each individual. This obviously implies the absence of search and bargaining costs. Consequently, contract costs are the only transaction costs to be considered in this paper. Still quite a large part of empirically observed transaction costs, these costs include the joint losses due to contractual ignorance or misrepresentation, and the joint losses resulting from oversimplified contracts such as fixed rental agreements, constant percentage piecerate or quota contracts for workers, budgets or profit-sharing contracts for managers, and cost-plus contracts.

B. Initial Acquisition Costs

Transaction costs do not include the costs of acquiring the initial distribution of property rights. These costs are assumed to be identically zero as we arbitrarily distribute the initial property in a mutually exclusive, exhaustive pattern. Allowing such costs would immediately admit inefficiencies in a laissez-faire competitive equilibrium because individuals have a private advantage in devoting resources to claiming rights to a given piece of property (the total revenue from the property) which exceed the social advantage of these resource-using activities (the consumer surplus gained by price-rationing the benefits of the property). As a result, too much property would be claimed as private rather than common property and there would be an over-devotion of resources to acquiring property not initially owned. Some of the more obvious empirical examples of the latter are: (1) the California Gold Rush,

where the value of the new gold was eaten up by the resources devoted to acquiring it before someone else did (Abudu) and (2) overworked fisheries, where competition to acquire a fish results in too much current (relative to future) fishing (Marshall).

A recent model of Spence shows a private overproduction of the kind of education which merely identifies, rather than trains, high-productivity workers for firms unable initially to determine the relative productivities of workers without knowing their educational attainments. Using our above result, workers would indeed overinvest in this redistributional form of education if the true productivities of workers could never be established. However, if true productivities could never be established, firms would have no apparent way of determining that the better educated workers were more productive. Once we admit that workers' productivities are eventually established, a system of bonuses can be used to reward the relatively productive, thus removing the profit from the activity of redistributional education. When contract costs of such bonus systems are prohibitive, the redistributional educational expenditures become a cost of the labor contract and fall under the subsequent analysis in this paper. The exercise shows that optimal government policy in the presence of contract costs may include the kind of tax policy that it uses in the presence of initial acquisition costs.

An element common to property acquisition costs and transaction costs of all types is the devotion of real resources to obtaining property that would otherwise benefit other individuals. It is this element that accounts for the efficiency of government controls on the property acquisition and transaction processes and the similarity of the efficient controls on these two types of costs.

C. Describing a Competitive Economy with Transaction Costs

An economy without transaction costs in competitive equilibrium (e.g., Debreu) can be described completely in terms of consumer benefits and productive services and the respective flow prices (or "rentals") of each over time. Prices of valuable current benefits and services in a competitive equilibrium in such an economy can be found by equating the current market demand and supply for each benefit and service. Prices and equilibrium amounts of future services and benefits (perhaps contingent on certain technological states of nature) depend upon the choice between current benefits and future benefits based on time preference and productivity. Prices and an equilibrium distribution of current rights to future services and benefits depend only on the initial distribution of wealth and the relative attitudes toward risk-bearing between individuals. Capital goods need not be explicitly referred to, even though they are the physical sources of consumer benefits and productive services. Bonds and conditional claims are merely contracts through which exchanges of present for future benefits or services are made; these contracts, like capital goods, need not be part of the description of an equilibrium.

In contrast, an economy with transaction costs cannot generally be described without making reference to capital goods and bonds. Once unavoidable transaction costs are introduced, markets for capital goods will generally replace the markets for benefits or services in a nontrivial manner. In general, some sequences of separate exchanges of rights to use flows of services or benefits are not worth the sequence of transaction costs required to make such agreements, even though exchanges of the capital goods which generate the flows are worth the capital-good transaction costs. Thus, we cannot generally describe the equilibrium in an economy with trans-

action costs without making explicit references to transactions in capital goods and future contracts. We shall call any property right—whether a service right, a leasehold, an ownership right to a present or future capital good, or a conditional claim—an asset.

We assume that all assets are pure private goods. This is a mere convenience intended to rule out the problems posed by non-pecuniary externalities and collective goods.[2]

We also assume the absence of technological uncertainty. This is more than a mere convenience. The change in prices resulting from an individual's purchase or sale of any commodity, while having only an insignificant effect on his own utility, may, by changing the cost of uncertainty which all other individuals must bear due to the presence of insurance costs, significantly alter the utility of others. Such an uncertainty-externality implies the optimality of all sorts of taxes and subsidies. We nevertheless conjecture that this externality is a small matter, empirically speaking, and assume away technological uncertainty in order to present relatively sharp theoretical results.

Each of a finite number of individuals is assumed to be maximizing a continuous intertemporal utility function defined over a Euclidean space of consumption benefits subject to (1) a non-empty, compact, benefit constraint set formed by combining an asset budget constraint for each point in time with a constraint expressing the technological cost and benefit flows of each transaction set, and (2) a production feasibilities set. It follows that desired purchase and sales correspondences exist for each asset. It follows from the budget constraint at each point in time that Walras' Law and zero-order-homogeneity with respect to accounting prices are satisfied at each point in time. We wish to apply the well-known existence theorem of Gale (Theorem 2) to demonstrate the existence of an equilibrium for each point in time for given expectations of future events and prices. But to do so, we require, in addition to Walras' Law and zero-order-homogeneity, the continuity of excess demand correspondences and the convexity of the set of excess demands that exist at a given set of prices. The usual device generating these conditions is the convexity of preference and production possibilities set (Arrow-Debreu). This device will not work in an economy with overhead transaction costs, however. With overhead transaction costs, the set of individual excess demands at a given set of prices is not a convex

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[2] While the gathering of information regarding the nature of a contract or a particular product in a transaction creates private transaction costs, the gathering of information which would alter *market* prices, such as inventions and weather forecasts, need not create what we are calling "transaction costs." If the latter type of information is produced and withheld from the public for a certain length of time in order to reap a speculative gain from individuals who are not aware of the relative inferiority of their information, there would be different expectations of market prices between individuals, and therefore the economy would be out of equilibrium. If, on the other hand, the use of this type of information were immediately sold at positive prices by a system of patents, it would mean that the information is a collective good. Since we are assuming that there is both a full general equilibrium and no collective goods, our model formally excludes the production of the type of information which alters market prices. A freely competitive economy would not be optimal if either differences in market price information or collective goods were to exist (Thompson (1966) and (1968), respectively).

set. Without convex excess demands at given prices, there is generally no way to prove that a competitive equilibrium exists, as is illustrated in Figure 1a. We shall, however, assume the presence of competing trading specialists, each of whom has insignificant overhead transaction costs and is willing to buy, sell, and store any amount of each asset. The prices at which these specialists trade are determined by transaction costs and their expected future prices and technology. The existence of these traders assures us that the set of aggregate excess demands at some set of prices is convex and contains zero. This is illustrated in Figure 1b and is sufficient for the existence of an equilibrium at any point in time, where all prices are non-negative and at least one consumption good price is strictly positive.

D. The Optimality Question

For the optimality theorem which is the main subject of this paper, we add the assumption that each individual is locally nonsatiated. In any neighborhood of any given consumption bundle, there is always a preferred current consumption bundle which contains no less of any consumption good. While this additional assumption is sufficient for the Pareto optimality of a standard competitive equilibrium, it is not sufficient for Pareto optimality in a competitive equilibrium containing transaction costs. The role of the government must, in general, also be specified in the latter case.

We shall be concerned with the Pareto optimality of a full competitive equilibrium.

E. Full Equilibrium in an Economy with Transaction Costs

A full general equilibrium is said to occur when there is a time-ordered set of desired purchase-sale equilibria, each corresponding to a distinct technology, in which there is perfect knowledge of current and future price offers and events. Consequently, in full equilibrium, individuals all know all "market prices" (i.e., relative prices between assets of agreed upon physical and legal characteristics); they cannot hold different beliefs concerning such prices.[3]

Nevertheless, individuals may still have differing beliefs in equilibrium to the extent that their information concerning the exchange contract and the physical properties of exchanged assets differs. These information differences, called contract information differences, are the only source of transaction costs that occur in a full competitive equilibrium.

F. The Specification of Government Policy

We shall assume that there is an economic agent called the government, which sets up a system of taxation and contract law, and thereby determines, given rational individual responses to the system, the contract costs associated with each possible transaction. The government-determined legal structure determines, by such methods as restrictions on the contract information which individuals can gather and distribute, the contracting procedures whereby individuals are induced to generate certain contract costs. We assume that this legal system is predetermined to be that

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[3] This was pointed out in footnote 2. Some severe and unfamiliar misallocations resulting from the phenomenon of differing beliefs regarding future market prices between individuals are pointed out in Hirshleifer (1971) and Thompson (1966).

Figure 1(a)

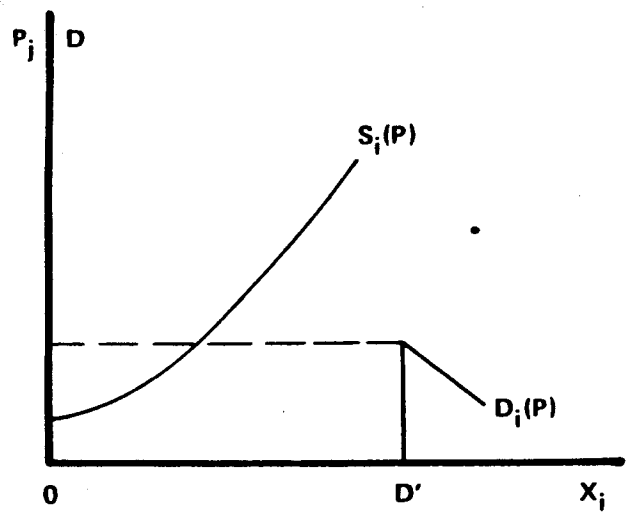
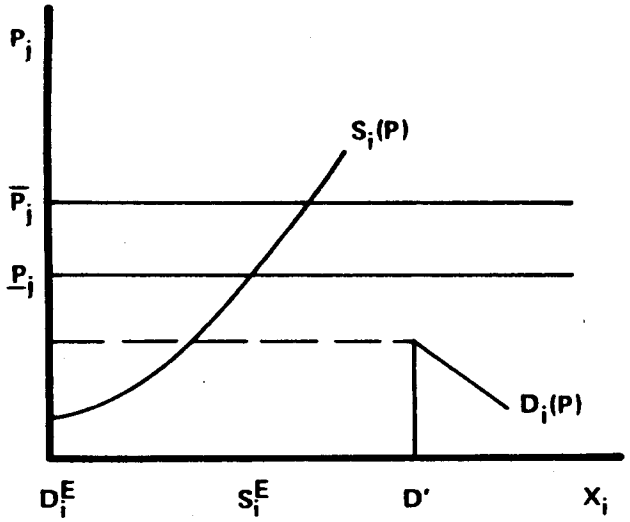


Figure 1(b)



X_1 = quantity of good i;

S_1 = quantity supplied of i;

D_i = quantity demanded;

P_j = the price of good j;

S_i^E = equilibrium supply of i given that the suppliers of i are also suppliers of j;

$\overline{P}_j$ = buyer's price of j;

$\underline{P}_j$ = seller's price of j;

$(S_i^E - D_i^E)$ = specialist demand in equilibrium.

structure which minimizes aggregate transaction costs for any given set of transactions. (In addition, all governmental administrative costs induced by a transaction are assumed to be included in contract costs by means of a user-tax on the transaction.) Thus, although contract costs are formally represented as technological losses to the transacting individuals, the levels of these costs are determined by a self-interested suboptimization process which is in turn affected by the governmentally supplied system of laws and taxes on transaction activities. The natural adversary relationship that arises because of imperfect contract information generates self-interested suboptimization processes in which individuals devote real resources to obtaining redistributional gains from their trading partners. These processes call for governmental restraints on transaction activities.

It should be pointed out that the policies which the government pursues in order to minimize the cost of a given set of transactions is very broad in scope, apparently much broader than the policies which economists traditionally recommend, using the framework of standard economic theory. The government may reduce the costs of a given private transaction by outlawing product misrepresentation, behavior which would have both sides rationally devoting real resources to the production of information advantages which create or prevent mere redistributions between the parties in the transaction. Contract costs might also be reduced by government imposition of certain universal conditions, such as caveat emptor and the declaration of illegality of penalties for non-performance in excess of actual damages on all contracts. The government may also reduce the sum of transaction costs by forcing certain transactions that would have taken place anyway (such as land transfers via land appropriation, sale for "urban renewal," and replacement of tax financing with lending via debt financing). This would eliminate some expenditures of real resources on the production of market information which has purely redistributional effects. That is, it benefits the information producer at the cost of the other party in the transaction. For example, the information produced by a land buyer about what he is really getting for his money or the information produced by a private lender about the ability of the borrower to default by "skipping out."

Moreover, the government may apply certain ad valorem subsidies and equal-percentage output taxes to a given industry in order to prevent producers from producing products which, due to the inability of some of their customers to perceive product quality prior to their use of the good, would be produced at overly low qualities and prices. And, in the case that producers devote resources to deception in order to raise prices above optimal levels, the government may apply certain ad valorem taxes and equal-percentage output subsidies in order to reduce the marginal profit to the deception to where it no longer pays, the result being a reduction in prices to efficient levels.

The government may also engage in direct production. Here, we assume that the government directly produces and distributes any asset in full equilibrium whenever this can be done profitably in real terms (given the costs of each transaction as determined by the governmental policy role described above) and, therefore, more cheaply in real terms than can private enterprise. Under this policy, the government obviates certain private transactions by itself engaging in production. Fire protection and emergency medical care are important examples.[4]

[4] However, the most obvious examples are found in the production of several kinds of collective goods such as national defense, bridges, and weather information. Such collective-type

In such examples, government production saves transaction costs because government suppliers, unlike private suppliers, provide services before attempting to reach a price agreement. Frequently, such an agreement is never reached. In general, the advantage of governmental production and distribution over private production and distribution is that transaction costs are saved because of the attenuated profit interest of the government suppliers. Such profit interest also is the source of the government's relative productive inefficiency; it leads the government to produce generally less efficient quantities at less efficient factor proportions than private producers. When (and only when) the productive inefficiency is less than the transactions efficiency, is governmental production "profitable." Alternatively, whenever the "benefits" of governmental production exceed the "costs," there is "profit" to government production.

It is assumed that an individual's purchases and sales have no effect on his relative incomes as a result of their effect on governmental production taxation or the legal system. It is also assumed that any taxes or subsidies (other than the above-mentioned transaction taxes and any user charges for government-supplied private goods) are lump sums. These assumptions will serve to rule out social inefficiencies resulting from: (a) spreads between buyer's and seller's prices which are not justified by real transaction costs and (b) purchases or sales which redistribute from others via induced changes in government policy. More directly, they allow us to use parametric market prices in specifying the budget constraints introduced in Subsection C above.

G. Summary of the Specifications and the Problem

To summarize briefly the specifications introduced in this section, we shall consider a complete array of private good-assets in a competitive economy admitting: (a) positive costs of some transactions, (b) specialist traders with no overhead transaction costs, (c) a system of laws and taxes which determines the level of private costs associated with every possible private transaction set in such a way that aggregate transactions costs are minimized for any complete set of transactions (this system would not change with the set of transactions in ways which redistribute incomes), and (d) government production under a benefit-cost criterion. The economy described always has a current competitive equilibrium; it has a set of current market prices for which no excess demands exist, given the expected joint probability distribution of all future events and market prices of each individual. We shall show that a full competitive equilibrium (a current equilibrium in which all future prices are known by everyone) in our economy is a Pareto optimum under the assumption of local nonsatiation.

2. NECESSARY AND SUFFICIENT CONDITIONS FOR A PARETO OPTIMUM

We now state three obviously necessary conditions for Pareto optimal current

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goods may be produced by the efficient government, not because of any free market under- or over-production of these goods (which would merely dictate a subsidy or tax policy), but because the private costs of erecting barriers, collecting, and excluding nonpayers (costs which are avoided when the government tax-finances and freely distributes its output of the collective good) may exceed the wastes due to misdirected incentives involved in the government's non-private-property reward structure (see Thompson 1965).

decisions. First, a system of laws and taxes must be chosen among the feasible alternatives such that there is a minimum of aggregate transactions costs for a given allocation of real resources to consumption and real production.[5] By keeping the allocation of resources to consumption and real production the same, we are holding constant the utility levels of all individuals. It is possible that real resources saved by an improvement under the first condition could be used so as to benefit at least one person without harming anyone else. In other words, any change based upon the first condition satisfies a Pareto Condition.[6] The tricky part of applying the first condition lies in changing the process of making transactions at the same time the new economy is adjusted so that the equilibrium allocation of resources toward the consumption and production of real assets remains the same at the same distribution of utility. This condition for Pareto optimality applies immediately, however, to economic activities which only alter the equilibrium allocation of resources to nontransaction activities through lump sum redistributions of wealth. Such activities, like the crimes of blackmail and extortion, should be effectively outlawed, because, whatever the distribution of wealth, these activities represent wasted transaction costs. The costs of blackmail and extortion are 100% transaction costs because these transactions are made solely in order to transfer property rights.[7]

The first condition for Pareto optimality is not implied by our assumption that the government minimizes aggregate transaction costs for any given set of transactions. Transactions for the consumption or production of consumables can stay constant while transactions vary, as can be done by varying transactions' financial assets.

The second condition for a Pareto optimal allocation of resources is that each individual has maximum utility for a given set of transactions. This condition is implied by our rationality assumption.

The third necessary condition for Pareto optimality determines an optimal division of resources between transactions and real production or consumption activities. No alternative set of transactions in real assets satisfies a Pareto Condition.

These three necessary conditions, taken together with an initial distribution of resources, are also sufficient to determine a Pareto optimal current allocation of resources. Given an initial distribution of resources and of information, the first con-

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[5] The aggregate of real transaction costs, when several types of resources are devoted to transaction activities, is dependent upon the weights on resources used in computing these costs. Our weights are the marginal productivities of the respective resources in saving some numeraire resource used in all transactions (say, leisure time).

[6] We have assumed that the government's administrative cost of effecting this change, if the change is possible, is zero.

[7] Examples of these activities which have been allowed to run rampant in the U.S. Economy are property ownership exchanges which do not alter the use of the property but are privately advantageous only because the buyer is more bullish regarding the property than the seller. Such "purely speculative" transactions are most familiar in markets for raw land, that will be used by neither the buyer nor the seller, and previously issued bonds and stocks, that are either nonvoting or held for a period too short to allow any owner to affect the decisions of the company. This speculation problem does not arise in our model because differences in price expectations are not consistent with a full general equilibrium.

dition determines an optimal cost of making any transaction involving real assets. The second condition determines the value of making the transaction by attaching individual benefits to the various real assets. Finally, using these two conditions, the third condition determines reallocations until further transactions in real assets that will satisfy a Pareto condition can no longer be made. When such a situation is achieved, there is a Pareto optimum.

If there were no transaction costs, these three conditions would degenerate into the second and third conditions. The second would still be trivially satisfied by our rationality assumption. The third, which is equivalent to the familiar definition of Pareto optimality, would of course be satisfied in a competitive equilibrium containing no transaction costs.

Since the second condition is trivially satisfied under our rationality assumption, we can concentrate on the first and third conditions.

3. ACHIEVING A PARETO OPTIMAL GENERAL EQUILIBRIUM

A. Satisfying the First Condition for Pareto Optimality

Given minimum aggregate transaction costs for any complete set of transactions, we need only establish that, in competitive equilibrium, a minimum aggregate cost of transactions in financial assets exists for a given set of transactions in real assets, assuring a minimum aggregate transactions cost for a given allocation of resources to production and consumption activities. Now for a given set of transactions in real assets, an individual's deficit or surplus is given at each point in time. The individual selects amounts of each type of financial transaction which minimize his cost of financing the given set of real transactions by minimizing the sum of his interest payments and his cost of transacting in financial assets. (This implies, of course, that he is maximizing the difference between his interest revenue and his cost of transacting in financial assets when he has a surplus.) Aggregating these financing costs over all individuals, and using the fact that aggregate interest payments over all individuals are identically zero, we find that aggregate transaction costs have been minimized for the given set of transactions in real assets.

This result may seem rather peculiar because each individual is minimizing finance costs rather than costs of transacting, but it should be kept in mind that when an individual incurs higher costs of transacting "merely" to reduce the interest cost of his deficit, he is reducing someone else's interest return by an equivalent amount. Hence, in a world with competitive banking, when an individual incurs extra costs of transacting by acquiring bonds which bear higher interest than money, he is also reducing the banks' cost of transacting by an equivalent amount because the latter cost is also equal to the same interest differential. Thus, the conventional Friedman Samuelson argument for the undersupply of real cash balances does not apply in a competitive money economy. An analogous argument in a competitive money economy with completely avoidable transaction costs is found in Thompson (1973).

B. Satisfying the Final Condition for Pareto Optimality

The original economy, altered by only those programs which enable the economy to satisfy the first condition for Pareto optimality, also satisfies the third and final condition, which states that there is no reallocation of real assets that makes at least one individual better off without harming anyone else. To see this, first note that

we may now treat transaction costs as privately incurred, unavoidable real costs of transferring real assets from one user to another. This follows from (1) the assumed taxation of transactions according to the real costs the government incurs in redefining property rights, so that all real transaction costs are private transaction costs and (2) the above-achieved minimization of transaction costs for any allocation of resources to the production and consumption of real assets.

Our proof will make use of a profit maximization condition. Therefore, we make two additional, supporting assumptions. First, output prices are set so that the buyer pays all of the transaction costs and resource prices are set so that the seller pays all of the transaction costs. Our theorem is therefore restricted to the case of no sales of intermediate goods, although we conjecture that a proof exists for the general case. Second, with no loss of generality, we assume that retained outputs are "sold" to the producer at market prices (but no transaction costs).

The individual's optimization problem, described in Section 1, is now a dynamic programming problem. Following Bellman's Optimality Principle, we consider the last transaction date first. The Pareto optimality of our competitive equilibrium at the last transaction date for given allocations in the previous periods is easily established by a variant of the classic Arrow proof of the Pareto optimality of a competitive equilibrium without transaction costs. For example, suppose that the equilibrium from the last transaction date to the end of life is not a Pareto optimum. There then is a feasible allocation of resources from that date to the end of life which differs from an equilibrium but which makes someone better off without making anyone else worse off. The existence of locally nonsatiated, rational consumers facing parametric prices and the absence of consumption externalities implies that the allocation hypothesized to be Pareto superior would require a greater value of consumption and, therefore, of income for an individual who benefits in the allocation. It also would require no smaller value of consumption and income for anyone else when the new allocation is evaluated at equilibrium prices. The aggregate value of income in the new allocation at equilibrium prices thus exceeds the equilibrium value. Since aggregate profits are already maximal over the feasible production set at equilibrium prices, however, the hypothesized allocation is infeasible, which is a contradiction. Let us now consider the next to last transaction date. If prospective consumption from the last transaction date to the end of life is determined by the savings of each real asset in the prior period, we may write the next-to-last transaction date's lifetime utility as a function of consumption benefits and savings of real assets in the next-to-last period. This is maximized, subject to an income constraint stating that the value of consumption and savings is the value of output in the next-to-last period and to a real-asset transactions cost constraint containing real asset endowments at the next-to-last transaction date. This does not deny that individuals hold cash or bonds as stores of value. It converts these assets into their debt equivalents of real assets in the last period, appropriately reducing the real assets of the creditors and suppliers of cash in the last period so that the net effect obeys a real asset income constraint for each individual. It is crucial here that we have achieved minimal transaction costs for any given set of transactions in real assets. Now, suppose, that there is an alternative, feasible set of consumption and productions in the next-to-last period such that at least one individual is better off and no one else is worse off. The value of present and prospective future consumption evaluated at equilibrium prices must be high for at least one individual and no lower for anyone

else, implying that profits evaluated at equilibrium prices are higher than in equilibrium—a contradiction because it implies that the alternative allocation is infeasible. This procedure can be applied to all transaction dates back to the present.

4. TWO APPLICATIONS

An immediate application of our result is in determining the government's optimal role in the financial system. The efficient government may create assets which compete with privately supplied money. As long as they are costlessly produced paper assets, their acceptance as media of exchange is sufficient evidence of their superiority over privately produced paper monies in certain sets of transactions. The efficient government also may control the quality of privately produced monies in order to reduce the cost of transacting with such monies. This can be done, for example, by offering public insurance against the non-redemption (via bank failures) of the privately supplied monies of banks that also satisfy certain safety features, but it is generally inefficient for the government to otherwise tax (or subsidize) the creation of private monies. Clearly inefficient are policies which prevent interest payments on private monies, restrict branch banking or entry into the banking business, or tax the private money supply by requiring private banks to transfer government money to the government in order to issue their private money. A variety of this laissez-faire type of monetary system has been shown to be superior to a system so constrained that the government can manipulate the total money supply in a setting which permits involuntary unemployment (Thompson, 1974).

A powerful application of our result on the general overdevotion of resources to the initial acquisition of property rights can be established once we introduce an explicit mechanism for government decision making. Assume the government decision process is an unconstrained, non-unanimity, voting process. The principles of efficient government policies we have described, once recognized, will be adopted because a voting system will always choose some Pareto optimal allocation over a non-Pareto optimal allocation. However, if the voting process is allowed to treat questions of income distribution, a Pareto non-optimality arises to the extent that individuals will devote resources to obtaining redistributions through the political process. This activity will continue until the real resource cost of obtaining a redistribution is no less than the income redistributed. In such a situation, the marginal redistribution leaves the recipient no better off and the loser significantly worse off, so that redistributions occur which should not occur from a Paretian standpoint. All individuals would be better off if they were to estimate their lifetime utility, including future redistributions through the voting process, to perform initial lump-sum redistributions achieving at least these utility levels. Further redistributions by means of the voting process would then be made unconstitutional.[8]

The strong suggestion of the above application, combined with the central theorem of the paper, is that the efficient government should never tax or subsidize ordinary transactions in an equilibrium unless such policies serve to internalize technological externalities, cancel pecuniary internalities (Thompson 1968), close down markets in order to create externalities that are more cheaply internalized by tax

[8] This is in the U.S. Constitution, where Congress is only empowered to make laws in the *general* welfare. Our courts have interpreted this so broadly that the constraint is meaningless.

policy than by the free market or reduce transaction costs for a given set of transactions. One may object to this suggestion by arguing that it is too difficult a burden on society to have to gather information on whether or not various taxes satisfy any specific efficiency criteria. But without the specification of the basis of taxation, how can administrators of the private property system know what to do? Consider, for example, a judge deciding, say, a class action suit for smog damage. How can he know whether to admit the suit unless he knows whether or not the observed tax structure is already making the smog creator pay the social cost of the smog? Only by knowing the basis of observed taxes can the judge know he is making a correct decision.

SUMMARY

A Pareto optimum is achieved in a competitive equilibrium containing transaction costs but only pure private goods only when the government establishes a system of laws and taxes which minimizes aggregate transaction costs for each set of transactions and uses real benefit-cost calculations to make production decisions. On one hand, this result permits a more pervasive influence of government than does the standard view, where only monopoly and externalities rationalize government intervention. On the other hand, it places rather severe limitations on those government policies which can be rationalized in the presence of contract costs.

However, our general result limiting the optimal role of government does not hold once we allow positive costs of property acquisition. In this case we have too many resources devoted to acquiring property rights. An additional role of the government suggested by the positivety of initial acquisition costs is thus that the government should restrict the private acquisition of otherwise common property and should itself manage and produce the common property under a benefit-cost criterion.

Finally, those optimal taxes and subsidies must serve only to remove pecuniary internalities and technological externalities; they must not serve to redistribute utilities. The losses of redistributional tax-subsidy policies in a democracy can be viewed as a special case of the general overdevotion of resources to acquire property from others, given initially undefined property rights. It would conserve the resources individuals in a democracy are continually induced to devote to acquiring or preventing redistributions by way of the political process if individuals were to be given, at this moment, the estimated present value of the income they will acquire or lose from the dynamic voting process (Static non-unanimity voting processes never have an equilibrium [Thompson (1969)]) and the further redistribution of utility were to be made unconstitutional.