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TRANSACTIONS TECHNOLOGY AND THE USE OF INTERMEDIARY AGENTS

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by

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Transactions Technology and Intermediaries

Define an intermediary as an agent whose business consists of resale without substantial alteration of goods (other than money) he has purchased. Intermediation may naturally occur combined with other activities: transportation, repair, packaging. It will be convenient to ignore these related activities, as though they occurred in separate firms. Since the process of acquisition and sale may require the passage of time, intermediaries may perform storage activities. Typical intermediaries are retailers, wholesalers, stockbrokers, banks, insurance companies and bookmakers. Why should one buy goods from a retailer rather than from the manufacturer? Why are loans made through banks rather than as contracts between individual agents?

In a world where transactions were costless, intermediary firms would serve no function and in an efficient allocation would not operate. Ignoring for this analysis problems of monopoly and possible non existence of equilibrium (but see [2]), intermediaries will be useful in the complex

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of buying and selling transactions takes place at lower total transactions cost when conducted through the intermediary than when transacted directly. This is particularly difficult inasmuch as the use of intermediaries will tend to increase the gross volume of trade. Each seller must sell to the intermediary, who in turn sells to the buyer, perhaps as much as doubling the number of transactions taking place, as compared to a regime of buyers and sellers trading directly. The lowered transactions cost may occur simply because of technical superiority. The intermediary may possess a particularly low cost transactions technology. But even if the transactions technologies of the intermediary and the transactors are identical, the intermediary may have lower unit costs by virtue of scale economies. That scale economies are reason for specialization is a classical observation, and transactions costs are generally thought to exhibit set up costs or other increasing returns [4].

A transactions technology specifies for any combination of possible purchases and sales, buyers and sellers, how much of various commodities will be used up as costs in the transactions process.¹ If we associate

¹Transaction and transportation are distinct activities. Indeed, in the formal sort of model where goods are identified by (among other characteristics) their locations households perform no transportation activities; transport is a production activity that is left to firms. Nevertheless, casual observation suggests many transactions involve, in addition to transfer of ownership claim, physical transportation of the purchased item. The choice facing agents then is for the seller or buyer to transport the goods themselves or to arrange for transport by a third party. Transport costs surely then enter individual decisions and determination of what is an efficient allocation. It may be efficient to incur a higher than necessary transactions costs if this permits a reduced transport cost. Bearing in mind that transaction and transportation are distinct and often independent activities, I think it does little harm to the present analysis if one thinks "transactions/transport" when "transactions" appears.

a technology with a specific agent, in whose transaction technology must an agent's transaction lie and whose technology determines the required transactions inputs? Buyer's, seller's, either, both? A standard approach in other contexts is to let each agent's transactions and transactions costs be determined by his own technology [3]. Such a specification has the advantage that it allows the household's transactions decision to depend only on its own budget and technology constraints. But this is no longer an advantage in an analysis where it is essential that the resources devoted to transactions by one agent (the intermediary) influence the decisions of other agents. To represent fully this phenomenon we would seem to require a joint technology specifying costs to all parties as a result of buying and selling decisions of all agents with an intermediary. The joint technology would then be associated with the intermediary. An alternative, nearly equivalent, approach adequate to the present context is to let buyer and seller choose which of their two technologies the transaction enters. This will presumably be decided on the basis of lower transaction cost. The most general formulation is to specify a transactions technology for the economy as a whole [1]. The difficulty here is that the relation between individual technologies and those of the economy as a whole is likely to be obscure. Two traders' transactions technologies are said to be similar if they are identical except for the transposition of the traders' names. A program is a list of all trades and transactions costs in the economy. A program is constrained to be within the agents' technologies and consistent in the sense that for every buyer there is a seller and vice versa.

Efficient Programs

Given a program of direct trades under what circumstances would it be preferable to use intermediaries? In order to avoid problems of reformulation of agents' demands and supplies when faced with changing transactions costs I will take the net purchase decisions as fixed. The problem then is to minimize total transactions costs. By use of intermediaries can each household achieve the same purchase with lower transactions inputs than was the case by direct trade?

Proposition 1: Let transactions technology be similar for all traders. Let the technology have (strictly) diminishing marginal transactions cost. Suppose that for any net trade there is always a trade through an intermediary that is not more costly than direct trade. Then any program without an intermediary where at least two agents are buyers or sellers of the same commodity is dominated by a program with intermediary.

The reasoning behind Proposition 1 is straightforward. Replace the program without intermediary by one with the same net trades passing through a single intermediary. By similarity, diminishing marginal input, and no cost increase due to intermediation, there is such a program with no increase in cost. Further by (strictly) diminishing marginal cost and the specification of the original program, there is a program using intermediary with a reduction in transactions costs.

Proposition 2: Let transactions technology be similar for all agents, and such that all goods may be transacted independently and for each good and each trader there are separate constant marginal transactions costs. Then any program using an intermediary is dominated by one without intermediary.

The reasoning behind this proposition is the obverse of the previous one. Consider an alternative program in which all trades are made by ultimate buyers and sellers. The volume of their trades does not increase and those of intermediaries declines. Since all technologies are similar, separable, and of constant marginal cost the decline in the gross volume of trade implies a decline in transactions costs. Proposition 2 says that if there are neither economies nor diseconomies of scale in transactions and all agents have the same separable positive marginal transactions cost technology, then in an efficient program no agent will act as intermediary. With a linear technology that all agents share there is no advantage in having others perform transactions for one. Since the use of intermediation requires an increase in the gross level of transactions in order to achieve given net transaction, constant positive marginal transaction costs ensure that this will be wasteful.

Conversely, Proposition 1 states conditions under which intermediation, despite similarity of agents' technologies, is always the more efficient approach. If the increase in gross transactions caused by the use of intermediaries is itself costless and there are economies of scale in transactions then the use of a single intermediary agent is more efficient to handle all transactions than a program with agents handling their own transactions (or a program of several intermediaries).

In summary, the absence of scale economies and positive costs associated with the increase in gross transactions are sufficient to prevent the use of intermediaries. Scale economies in transactions and no cost associated with the increase in gross transactions are sufficient to imply that the use of intermediaries is the efficient transactions technique. Clearly most cases will fall between these extremes.

Scale Economies on Two Levels

Scale economies may occur at the level of the firm or of the individual transaction (or both). Firm level scale economies, while having little effect on the size of individual transactions, cause the concentration of trade in a few firms.

If we have five sellers and five buyers each of one unit of the same commodity they may trade directly. It is common, however, that they will prefer to trade through an intermediary. An example is the choice of selling one's car through classified advertisements or a used-car dealer. So far as I can tell, the cost saved here is that associated with buyer and seller finding one another. It may be regarded more as a cost of search rather than of transaction. The scale economy involved then is that it is easier when looking for a suitable purchase to visit one used-car dealer with five cars than to visit five used car owners. Estate agents provide a fairly clear example of the reduction in search costs as a result of concentrating in a single institution, offers to buy and sell. Estate agents do not properly fulfill the definition of intermediary above in the sense that they are not generally buyers or

sellers of property so much as dealers in market information. Institutional structure aside however, I think the similarities are sufficiently great to suggest that estate agents and used car dealers perform essentially the same function. A major function of intermediaries, particularly those dealing in goods that are substitutes for one another, is the concentration and dissemination (for a price) of market information telling what goods are available and at what price.

Economies of scale at the transactions level are a distinct phenomenon. Purchasing several commodities from a single agent may be less costly than buying them from each of several sellers. Such a situation reflects diminishing marginal cost as the scale of transaction is increased. Such scale economies may also serve to explain the existence and function of intermediaries. For example, if there are ten sellers of ten distinct commodities and twenty buyers each requiring some of each of the ten commodities, in the absence of intermediation 200 separate relatively small transactions will ensue. If a single intermediary is used there will be only thirty large transactions. The gross volume of trade is doubled (since each commodity is now traded twice) but the savings associated with the reduction in the number of separate transactions may more than compensate. Denote by "clustering" the practice of trading commodities together in order to take advantage of scale economies on the size of transactions.

What combinations of commodities will display clustering economies in transactions that actually take place (as distinct from those merely possible under the transactions technology) will depend on the coincidence

in agents of the clustered demands or supplies and on complementarities in the transactions technology. Agents with a demand for bread are likely to have demands for butter and jam as well. Agents with an excess supply of cold rolled steel are likely to have steel wire and I-beams available too. Intermediaries for the sale of non-fiction books are likely to find that their expertise carries over, at least partially, to the sale of fiction and periodicals.

A particularly common and useful form of clustering occurs when several commodities, usually closely related in some functional way, are transacted together as a unit (for lack of a better term, composite commodities [1]). It is common, for example, for the use of land or buildings at a sequence of dates--a family of distinct commodities--to be exchanged as a unit for money deliverable at sequence of dates (not necessarily the same sequence). Another example is contracting in a single agreement the exchange of labor at a sequence of dates for money at a distinct sequence of dates. Purchase of an automobile as a unit rather than purchase of its constituent parts separately is another example of the common occurrence of composite commodities, as is the use of long bonds rather than a sequence of notes. The reason for use of composites is the relatively low transactions cost of exchanging them compared to the cost of trading their constituent parts separately, and the occurrence in the intermediary and the demander or supplier (or both) of approximately reciprocal wants. The saving of transaction cost resulting from use of the composite may compensate for accepting trade in a composite, not all of whose constituents one actually wished to trade.

Financial Intermediaries

Financial intermediaries generally consist of a portfolio of assets and liabilities, some certain, others risky [5]. To the extent that the intermediary's creditors and potential creditors are risk averse it is desirable that the portfolio be made up of a large number of statistically independent contingent contracts, in order to achieve the resulting low risk. The superiority of a certain (and hence diverse) portfolio is a distinguishing characteristic of financial intermediaries. The superiority of a diverse portfolio over a specialized one implies that the market is prone to clustering, since demand is essentially for a family of related commodities. Clustering will occur if transaction technology exhibits scale economies at the transactions level. Financial intermediaries generally sell as "riskless" a composite commodity which is really a security equivalent to a diverse portfolio of risky assets. If one wished to dispense with a financial intermediary, an equivalent allocation could be achieved by giving to each creditor a pro rata portion of the intermediary's portfolio designed precisely to pay off in the event of the creditor's claim falling due and with the same risk of default as obtained in the presence of the intermediary. But to actually acquire this portfolio each creditor must acquire many relatively small securities from the intermediary's erstwhile clients, each of whom would sell to many such creditors. Dispensing with the intermediary results in a substantial increase in the number of transactions, and hence an increase in total transactions costs if there are scale economies on the size of transaction.

A bank is a portfolio of contracts for future delivery of money at various dates. In a banking system without deposit insurance or a guaranteed lender of last resort a bank deposit is not a certain asset. Rather, it is a composite commodity equivalent to a portfolio of contingent commodities promising the face amount of deposit in those states of the world where the bank's portfolio pays off enough for the bank to remain solvent and reduced payments in those states where the bank is bankrupt. A loan by the bank to an agent can be replaced in the absence of the bank by a loan or sequence of loans from the bank's depositors to the agent in question. If the loan itself were not risky (or the lenders not risk averse) and there were no scale economies at the bank level, then none of the transactors would be the worse for the absence of the bank. If, however, the lenders are risk averse they will seek a more diversified portfolio, a policy that will be increasingly costly to the extent that there are scale economies at the transactions level.

The existence of insurance companies is another example. It is perfectly possible to have insurance without specialized insurance firms. A typical insurance policy consists of a complex of contingent contracts: in each of a family of specified states of the world the insurer will pay specified amounts of money (net benefits) to the insured, in all other states the insured will pay a specified amount (the premium) to the insurer. Such contracts can, of course, be written between individual agents. However, risk averse agents will not in general wish fully to assume another agent's risks. In order to achieve adequate risk spreading each agent will want to hold a portfolio of statistically independent risks.

Consider the allocation of risk that would result from the distribution to the shareholders of an insurance company's proportional shares of the firm's assets and liabilities. Each of the shareholders would then hold a portfolio of insurance contracts, as many contracts as there were policyholders of the original firm. The value of this portfolio should be identical to the asset value of his shares. Each policyholder's insurance coverage, though fragmented now among many insurers, remains unchanged. What is wrong with this allocation? What function did the original firm, now disbanded, perform that this collection of individual agents cannot? The answer lies in the scale economies at the transactions level. If a policyholder wants now to collect benefits he must go to each of the many shareholders to collect, rather than to the single insurance firm. When premiums are to be paid they must be paid to many agents rather than just one. If there are scale economies in transactions, this implies that the new program of many small transactions is less efficient, with higher transactions costs, than the original scheme using the specialized agent.

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