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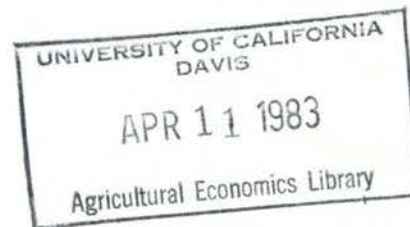
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PRODUCTION FUNCTIONS, TRANSACTIONS COSTS
AND THE NEW INSTITUTIONALISM

by

Victor P. Goldberg

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Department of Economics
University of California
Davis, California

PRODUCTION FUNCTIONS, TRANSACTIONS COSTS AND THE NEW INSTITUTIONALISM

Victor P. Goldberg*

I. Introduction

For most of the postwar period, economic theory has focussed on the analysis of impersonal markets. In the past few years, however, there has been a resurgence of interest in the role of institutions in the allocation process: Why does some behavior take place within firms and not within markets? Why are long-term contracts used instead of spot markets? What determines the structure of long-term contracts? How does the internal organization of a firm effect its performance? Why are some workers compensated by piece rates, others by hourly wages, and still others by annual salary? What are the effects of seniority provisions or of a legal prohibition of termination of employment contracts at will? Does the structure of employment contracts have an influence on macroeconomic variables? What are the effects of alternative tort liability systems on accident rates? And so forth.

In this paper I want to consider two concepts --production functions and transactions costs -- that have been used and abused in developing the New Institutionalism. If we are to rely on them at all in our exploration of the causes and effects of economic institutions, it will be necessary to subject them to careful scrutiny. My reading is that the transactions cost concept in particular has proved to be misleading and unhelpful and that it would be best if we simply abandoned it. However, the terminology is probably too deeply entrenched for this cold turkey approach to succeed. My more realistic hope is that the following discussion will at least result in the concept being used with greater care than has heretofore been displayed.

II. THE PRODUCTION FUNCTION

A production function is a technical relationship between inputs and outputs. Mix three units of one input with four of another and out come five units of output. It does not matter who owns the inputs or the outputs. Or does it? The pragmatic answer is that institutional arrangements like ownership do matter, but for the problems under consideration we can assume their effects on the production relationship remain unchanged. That is, the production function implicitly includes the effects of specific institutional arrangements on output. For example, if workers in a firm "shirk" 20% of the time, a change in the wage rate would not effect the ratio of their work effort to the amount of work they would provide in the absence of shirking. A second answer is to decompose the production function into a technical production function which translates unobservable inputs (efficiency units) into outputs and has the nice properties of standard theory, and a transformation function which translates observable into unobservable inputs. The former holds regardless of the institutions, but the latter does not. Thus, if workers shirk less in a worker-controlled firm than in a stockholder-owned firm, an hour of worker time would result in more efficiency units of labor in the former. If we assume that a particular institutional change has no systematic effect on this transformation function, then the second line of argument leads to the same results as the first.

If we do assume that both the technical production function and transformation function are independent of institutions, then the effects of alternative institutions are manifested in the relative prices confronting decision makers and in their objective functions. (The capitalist firm

maximizes profits; the worker-controlled firm maximizes profits per worker or some similar concept.) My concern is not with the invariance assumption itself, which can frequently be useful, but with the lack of thought regarding its appropriateness. One need only look at the chapters on welfare economics in virtually all price theory textbooks. Production functions are given. The efficiency conditions are determined in an institutional vacuum. The performance of particular allocation systems is then compared with the efficient one and the conclusion emerges that an impersonal price system or Lange-Lerner central planners could yield the same efficient production. The heroic nature of the assumption that the production relationship is the same across all institutional arrangements is sufficiently obvious that it does not warrant further comment.

I do not want to pursue further the question of the appropriateness of the invariance assumption for comparative general equilibrium analysis or for the comparative statics of the organization of work. Instead, I want to move to a less obvious context. Consider the familiar Coasian example of the railroad sparks and the farmer. (Coase, 1960, pp. 29-34) The amount of damage that occurs depends upon the avoidance behavior of both the railroad (installing spark arresters, etc.) and the farmers (planting further from the track, etc.). This relationship is summarized in a "production function for accident avoidance." To determine the efficient amount of avoidance effort by the two parties we suppose that the railroad and farmer merge so that the "externality is internalized" -- a single decision maker perceives the benefits and the costs and has the incentive to seek the optimal balance. We then assume that for some reason the merger is not feasible,

and ask how incentives could be structured so that the independent parties could be induced to produce the same efficient behavior as the merged firm.¹ Could taxes, subsidies, or liability rules (tort and nuisance law) produce efficient outcomes? We implicitly assume in such an exercise that there exist some unspecified factors which make the merger solution too costly. We assume further that these unspecified factors do not affect the decentralized alternatives and, moreover, that any other unspecified factors have no systematic effect on the cost effectiveness of the alternatives. In essence, we assume that the technical production function is invariant to institutions but that the transformation function does vary in a systematic, if somewhat peculiar, way.

As a variation on this theme, consider the question of the influence of the production technology on whether economic activity is performed within firms or across firm boundaries. For example, does the existence of economies of scale or scope tell us anything about the efficient size of firms or of the efficient firm boundaries (vertical and lateral integration)? The literature is full of answers in the affirmative. "Natural monopoly" follows from economies of scale;² vertical integration is limited by the extent of the market;³ economies of scope result in multi-product firms.⁴ But there is a problem. Why must the economies of scale be achieved within an organization? Why can't they be achieved equally well if the factors of production are owned by independent individuals? In the previous paragraph the implicit assumption was that for unspecified reasons merger was too costly; here we assume, also for unspecified reasons, that anything but merger is too costly.

Propositions regarding institutional structure cannot be derived from purely technical production relationships without invoking some other factors. A venerable example of this point is the old problem of efficient firm size in a competitive industry with constant costs. With those cost conditions, the efficient firm size would be indeterminate. Determinacy was achieved only by positing some scarce limiting factor such as entrepreneurial skill. This band-aid solution obscured the more fundamental point. Firm size would be indeterminate with constant costs, decreasing costs, or increasing costs. So long as the costs are independent of the organization form, this must be true. Efficient firm size depends ultimately on organization-specific costs--which are precisely the ones excluded from the technical production function.

This does not mean that there are no predictable relationships between the production technology and institutional outcomes. The statements "propositions regarding institutional structure cannot be derived from purely technical production functions" and "a production process exhibiting extensive economies of scale will tend to be performed within a single organization" are not logically inconsistent. If the factors that result in scale economies are correlated with those making coordination within a single organization desirable, then the statements would be consistent. The second proposition can, however, be very misleading if it directs attention away from the elements that determine the relative efficiency of alternative organizational structures.

III. TRANSACTIONS COSTS

My hostility to transactions costs must strike most readers as odd, since the "new institutional economics" and "transactions costs economics" are often thought of as synonymous.⁵ My concern in this instance is perhaps more semantic than substantive. It does seem to me, however, that "transactions costs" runs the risk of becoming the "imperfect capital markets" of the 1980's, the all-purpose answer that tells us nothing.

A bit of history. In his early paper on "The Nature of the Firm" Coase (1937), in effect, said: if markets work as well as they do in our models, then no alternative system could do better, and most would probably do worse; why then, he asked, would anything but impersonal markets emerge and thrive? Since firms do exist and do thrive, we must ask how such organizations could be superior to the impersonal markets. The answer --or really the first part of the answer --was that impersonal markets weren't so darn perfect anyway; their imperfection he called "transactions costs." Two decades later, Coase (1960) conducted the same sort of exercise with externalities. Economists were classifying goods in two categories: for normal goods (with zero transactions costs) markets worked perfectly; for externalities (with infinite transactions costs) markets worked not at all. Coase never bothered to give a precise definition of transactions costs because he didn't take the concept very seriously. It was only the name of whatever it was that economists had been ignoring; the intent in both papers was to move analysis away from a world in which market perfection was an all-or-nothing affair.⁶

Economists have a number of essentially equivalent ways of characterizing the conditions resulting in efficiency. If transactions costs are zero, if all markets exist, if marginal social product equals marginal private product, or if there are no externalities, resources would be allocated efficiently. When there is a shortfall from perfection, as there inevitably must be, there is a tendency to identify its source in terms of the characterization--positive transactions costs, market failure, or whatever. This leap of logic is the source of much of the semantic confusion that has permeated much of the post-Coase discussion of transactions costs.

The phrase "transactions costs" captures the notion that transacting--engaging in economic activity--requires the use of real resources. It embodies two very different meanings. One focuses on identifiable activities involved in transacting.⁷ The concept would presumably include the costs associated with bargaining, negotiating, and monitoring performance --costs usually associated with the activities of purchasing agents, lawyers, accountants, and similar functionaries. It is analagous to the Marxist concept of "non-productive labor." What distinguishes these costs from others (or non-productive from productive labor)? Is an accountant's bill for \$10,000 any less painful than a bill for an equal amount from a steel supplier? Firms incur these costs because it is efficient for them to do so. It is cheaper to pay accountants to perform a task than to bear the additional costs of embezzlement that might occur in their absence. As far as the economic actors are concerned, transactions costs are the same as other costs.

The preceding formulation emphasizes the type of activities that might be included under the transactions cost rubric. An alternative formulation better captures Coase's intent. Transactions costs are those costs most likely to differ under alternative institutional arrangements. They are, in effect, the cost analog to the transformation function of the previous section. Thus, if the production function is defined in terms of efficiency units, the transactions costs are the difference between what could have been produced if actual inputs corresponded to efficiency units and what actually happened. The transactions costs are an unobservable residual; in effect, they are the opportunity cost of the world not being as nice a place as it otherwise might be. In this formulation, the transactions cost label is a redundancy. If we say that the transactions costs of the worker-controlled widget producing firm are higher than its capitalist counterpart we mean no more and no less than that it is less efficient in transforming inputs into outputs.

Propositions regarding relative institutional efficiency, whether normative or positive (e.g., cet. par., more efficient institutions tend to survive) should not depend on the level of transaction activity. There is no reason to associate high levels of transaction activity with inefficient outcomes. Some goods are "transactions-intensive" just as others might be labor-or capital-intensive. The set of activities in the "transactions sector" could include retailing, wholesaling, advertising, police, and even transportation and education. We can quibble about what the precise boundaries of the sector should be, but the important point is that there is nothing exceptional about the transactions sector. The sector's share can differ over time and across societies, but this tells us nothing about the relative efficiency of the societies in extracting outputs from inputs.⁸

IV. Concluding Remarks

The production function is ostensibly a relationship between observable inputs and outputs. Economists frequently make the implicit assumption that the production function is invariant to institutions. I am not asserting here that the invariance assumption is inevitably wrong. Rather I am suggesting a behavioral proposition about economists. They exhibit a strong tendency to use the assumption where it doesn't belong. If we were more conscious of what we are doing we would be less likely to make such errors as deriving institutional implications from purely technical production functions.

The transactions costs concept has been particularly misleading because it embodies two very different meanings. On the one hand, it has the natural meaning of costs associated with a set of activities involved in transacting. On the other hand, it can mean a shortfall from what could have been achieved if institutions worked perfectly. There is a strong temptation to join these meanings by attributing the shortfall to a particular set of activities. Much of the confusion involving the transactions cost concept has stemmed from this unfortunate linkage. By explicating this dual meaning, I hope that I have removed one of the barriers to understanding the causes and effects of economic institutions.

FOOTNOTES

*The author is Professor of Economics, University of California, Davis. I would like to thank the following for comments on an earlier draft: Moshe Adler, Avner Ben-Ner, Ronald Coase, Douglass North, Joseph Ostroy, David Teece, and Oliver Williamson.

1. Brown (1973) was the first to utilize this framework to analyze tort law.
2. This error is so ubiquitous documentation is unnecessary. For a debunking, see Demsetz (1968), Goldberg (1976), and Williamson (1976).
3. See Stigler (1951). The argument is criticized in Williamson (1975, pp. 16-19).
4. See Panzar and Willig (1981); the argument is criticized in Teece (1980).
5. "The new institutional economics is preoccupied with the origins, incidence, and ramifications of transaction costs." Williamson (1979, p. 233).
6. In a recent paper, Coase (1981, p. 187) made this point with rather colorful language:

... while consideration of what would happen in a world of zero transaction costs can give us valuable insights, these insights are, in my view, without value except as steps on the way to the analysis of the real world of positive transaction costs. We do not do well to devote ourselves to a detailed study of the world of zero transaction costs, like augurs divining the future by the minute inspection of the entrails of a goose.

7. Dahlman (1979) discusses critically two characterizations of transactions costs utilized by formal theorists. In one, a fixed proportion of whatever is being traded is assumed to disappear in the transaction itself; they are analytically the same as transportation costs. The second assumes that there are setup costs for transactions; the cost is fixed independent of the amount exchanged.

8. Thus, it is plausible that the monetized transaction sector (or nonproductive labor) has increased in the twentieth century, at least in the developed countries. A large amount of the work of the transactions sector is performed outside the monetized sector. Exchange with kinsmen, for example, typically requires less reliance on formal monitoring and enforcement mechanisms than does exchange with strangers. The resources devoted to enhancing mutual trust and cooperative behavior can be considerable. While there can be considerable cost reductions from trading with insiders, we should note that there also exists an opportunity cost to such autarchy; this cost is exacerbated if maintaining the integrity of the group is accomplished by demeaning the outsiders.

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