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A PROBABILISTIC APPROACH TO CONGLOMERATE MERGERS

LEE E. PRESTON*

Conglomerate mergers — like all other mergers — are prohibited under present law "where in any line of commerce in any section of the country, the effect . . . may be to substantially lessen competition."[1] Whatever the desirability of this prohibition as a general principle, the legal profession and the courts have been in some confusion over whether its application to conglomerate mergers requires methods of analysis or criteria for decision-making which differ from those methods and criteria established in more familiar horizontal and vertical merger cases. It is the contention of this paper that a significant expansion beyond the traditional approach is both required and justified. Specifically, I shall argue that in analyzing the impact of a conglomerate merger, the *number* of potential anticompetitive effects is a consideration of parallel importance to the *likelihood* of each such effect.

The basis for this argument is very simple: the greater the number of equiprobable anticompetitive effects associated with a merger, the greater the likelihood that *at least one* such effect will, in fact, be realized. And the likelihood of *some* anticompetitive effect may be very great, even though one may not be able to specify in advance precisely in which of the several potential lines of commerce and sections of the country it may occur. Further, since the typical large conglomerate merger gives rise to many such potential effects, there is a general presumption that most such mergers are likely to offend the law with respect to *some* sphere of competitive activity.

The argument, initially set forth in general terms, is subsequently developed in more detail with respect to one particular type of anticompetitive effect that may be associated with conglomerate mergers — the potentiality of systematic reciprocal purchasing and selling between firms.

POSSIBILITIES AND PROBABILITIES IN MERGER ANALYSIS

The suggestion that application of the Clayton Act requires a probabilistic framework of analysis is scarcely startling. In *Brown Shoe Co. v. United States*,[2] the Supreme Court stated that the word "may" in the statute clearly indicated a congressional concern "with probabilities, not certainties. Statutes existed for dealing with clear-cut menaces to competition; no statute was sought for dealing with ephemeral possibilities. Mergers with a probable

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1 Clayton Act § 7, 15 U.S.C. § 18 (1964), *formerly* 38 Stat. 731 (1914).

2 370 U.S. 294 (1962).

anticompetitive effect were to be proscribed by this Act."[3] It now appears to be generally — if, in some cases, reluctantly — agreed that the word "may" in the statute means "more likely than not."

The doctrine of quantitative substantiality relates the probability of anticompetitive effects to the *size* of the change in economic organization and ownership associated with a merger. The principle involved might be summarized as follows:

(1) The greater the magnitude of the structural change associated with a merger (*e.g.*, the resulting market share or related indicator), the greater the probability of anticompetitive effect.

Similarly, the doctrine of incipiency relates the probability of anticompetitive effects to the *pattern* of structural change over time:

(2) The greater the likelihood that a sequence of imitative or adjustive mergers will follow a particular acquisition, the greater the probability of anticompetitive effect.

These two principles have been used — not always explicitly — both individually and in combination to identify mergers that offend the law. *United States v. Von's Grocery Co.*[4] and *Brown Shoe* are classic examples of their application.

The new principle to be added, with particular reference to conglomerate mergers, is the following:

(3) The greater the number of (equiprobable) potential anticompetitive effects associated with a merger, the greater the probability that one or more such effect will, in fact, be realized.

This principle could, of course, be applied to the analysis of any merger affecting more than one product or geographic market. However, one of the special features of large conglomerate mergers is that their potential effects are spread across many such markets, although the particular market or markets in which these effects will, in fact, be realized may be difficult to specify in advance. Hence, consideration of the *number* of potential effects may be of special importance in assessing the expected impact of a conglomerate acquisition, just as the issue of quantitative substantiality has been of greatest importance with respect to geographically limited markets and the issue of incipiency most prominent with respect to industry-wide organizational developments.

Let us make quite clear what it means to introduce the *number* of potential effects as a central consideration in the analysis of mergers. It is frequently argued that one of the results of conglomerate acquisitions is the elimination of the acquiring firm as a potential independent entrant into the industries and markets served by the acquired firm. Assume that the

[3] *Id.* at 323.
[4] 384 U.S. 270 (1966).

elimination of such a potential entrant in any one market has only a probability of one-half (.50) of resulting in anticompetitive effects in that market.[5] Now, if there is only *one* market in which the two firms are potential competitors, the probability that their merger will "lessen competition" in *any* market (*i.e.*, "any line of commerce or section of the country") is only .5. And such a probability might be considered too close to the line to permit a judgment that the merger in question offends the law. However, if there are two markets, in each of which there is a .5 probability of an anticompetitive effect (and the two effects are considered to be independent), then the probability that *at least one* such effect will occur is .75. If there are three markets, with the same assumptions, the probability is .875, and so forth. As long as one deals with probabilities of .5, the analysis is precisely analogous to the expected results from tossing a fair coin. Although the likelihood of getting a head (or tail) on any one toss is only one-half, the likelihood of getting at least one head (or tail) in a series of tosses increases with the number of tosses in the series. In five tosses, for example, the probability of getting at least one head is .97. In other words, out of a hundred sets of tosses, five tosses per set, one should expect to get only three sets in which *no* heads appeared.

If the likelihood of the independent events in which we are interested is different from .5, the computation of the successive probabilities is tedious, although the principle remains the same. Fortunately, tables are available which eliminate the need for detailed computations for our purposes. A simplified form of such results is shown in Table I. To understand the Table, assume that one is experimentally drawing balls from an urn containing both red and black balls. One draws each ball individually, records the color, and replaces it, so that the proportion of balls of each color in the urn remains constant throughout the experiment. The likelihood of drawing any particular number of red (or black) balls during the experiment depends upon (a) the proportion of each within the urn, and (b) the number of draws permitted. The probability of drawing a red (or black) ball on each draw is simply the proportion of red (or black) balls within the urn. Tossing a fair coin is exactly analogous to drawing from an urn containing red (heads) and black (tails) balls in equal proportions. If the proportions are unequal, however, then so are the probabilities. Thus, from an urn containing one-fourth red and three-fourths black balls, the probabilities on each draw are: red — .25; black — .75. If two draws are made, however, the probabilities are:

two black, no red	— .5625
one black, one red	— .3750
no black, two red	— .0625

[5] This probability might arise either (a) because the firm had only a .5 probability of entering the market, although its entry would clearly increase competitive forces there; or (b) because, although the firm would certainly have entered independently, its entry was only .5 likely to actually increase the strength of competition — or any combination of these two factors.

Hence, the probability of getting *at least one* red ball in two drawings from the urn is .3750 + .0625 = .4375. This latter number is shown in Table I for n = 2, p = .25. Other entries in the table are to be interpreted analogously.

TABLE 1

PROBABILITY OF ONE OR MORE OUTCOMES WITH ATTRIBUTE *A* OCCURRING OUT OF *n* OBSERVATIONS, WHERE *p* IS THE PROBABILITY OF *A* OCCURRING IN ONE OBSERVATION

Number of observations	Probability (p) of *A*									
n	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50
1	.0500	.1000	.1500	.2000	.2500	.3000	.3500	.4000	.4500	.5000
2	.0975	.1900	.2775	.3600	.4375	.5100	.5775	.6400	.6975	.7500
3	.1426	.2710	.3859	.4880	.5781	.6570	.7254	.7840	.8336	.8750
4	.1855	.3439	.4780	.5904	.6836	.7599	.8215	.8704	.9085	.9375
5	.2262	.4095	.5563	.6723	.7627	.8319	.8840	.9222	.9497	.9688
6	.2649	.4686	.6229	.7379	.8220	.8824	.9246	.9533	.9723	.9844
7	.3017	.5217	.6794	.7903	.8665	.9176	.9510	.9720	.9848	.9922
8	.3366	.5695	.7275	.8322	.8999	.9424	.9681	.9832	.9916	.9961
9	.3698	.6126	.7684	.8658	.9249	.9596	.9793	.9899	.9954	.9980
10	.4013	.6513	.8031	.8926	.9437	.9718	.9865	.9940	.9975	.9990
11	.4312	.6862	.8327	.9141	.9578	.9802	.9912	.9964	.9986	.9995
12	.4596	.7176	.8578	.9313	.9683	.9862	.9943	.9978	.9992	.9998
13	.4867	.7458	.8791	.9450	.9762	.9903	.9963	.9987	.9996	.9999
14	.5123	.7712	.8972	.9560	.9822	.9932	.9976	.9992	.9998	.9999
15	.5367	.7941	.9126	.9648	.9866	.9953	.9984	.9995	.9999	1.0000
16	.5599	.8147	.9257	.9719	.9900	.9967	.9990	.9997	.9999	1.0000
17	.5819	.8332	.9369	.9775	.9925	.9977	.9993	.9998	1.0000	1.0000
18	.6028	.8499	.9464	.9820	.9944	.9984	.9996	.9999	1.0000	1.0000
19	.6226	.8649	.9544	.9856	.9958	.9989	.9997	.9999	1.0000	1.0000
20	.6415	.8784	.9612	.9885	.9968	.9992	.9998	1.0000	1.0000	1.0000

SOURCE: U.S. NATIONAL BUREAU OF STANDARDS, TABLES OF THE BINOMIAL PROBABILITY DISTRIBUTION (1950).

For those unfamiliar with probabilistic analysis, detailed inspection of the Table may yield some surprises. Particular interest attaches to the number of observations necessary to yield a probability greater than .5 that a particular type of event (*A*) will occur at least once, *i.e.*, that its occurrence is more likely than not. If the probability of such an event is .3 or greater in any one observation, then only two observations are required to yield a cumulative probability greater than .5. The number of observations required to yield a .5 probability rises to 7 for an event with a probability of only .1, and to 14 for an event with a probability of .05.

This particular probability framework is appropriate for the analysis of merger effects because we are specifically concerned with only two classes of events — those that do, and those that do not, substantially lessen competition. Further, we are principally interested in the probability that *one or more* events of a particular type will occur, rather than the *particular number* (if more than one), because the statute prohibits mergers that may

lessen competition in *any* relevant market, *i.e.*, in *one or more* such markets, and regardless of any other effect that may be involved.[6]

IMPLICATIONS

The principle involved here is simple enough, but its implications for the analysis of conglomerate merger effects do not yet seem to be adequately appreciated. On the contrary, the emphasis in most of the available discussion to date, both in the journal literature and in the courts, has been about equally divided between (1) the search for individual markets and industries to which traditional substantiality and/or incipiency criteria can be applied, and (2) the argument that increases in the relative size of large firms (aggregate concentration) as a result of conglomerate mergers are per se inimical to the maintenance of vigorous competition throughout the economy.

The first approach has engaged both proponents and opponents of mergers with about equal vigor. The proponents have been fully as eager to point out traditional markets unaffected by mergers among their participants as the opponents have been to identify spheres of competitive interaction in which substantial structural changes are taking place because of corporate mergers. Each side, of course, may be both right and relevant in particular instances. With respect to aggregate concentration, the principal themes may be summarized as "it matters" and "it doesn't," either with respect to antitrust policy alone or with respect to broader aspects of sociopolitical life.

To be very straightforward, it is my position that the changes in economic organization and market participation associated with large conglomerate mergers do "matter" with respect to antitrust policy. They matter because they typically involve changes in a large number of market relationships, and many of these changes *may* lead to anticompetitive consequences. Although the probability of each of these consequences may be relatively small, their number is usually sufficient to ensure that one or more is, in fact, extremely likely. This is true, as our simple probability analysis above indicates, even though one cannot state with any assurance *which* of the several affected markets will experience the anticompetitive effect. (Returning to the ball-drawing example, we cannot and need not specify on which of the several draws the red or black balls will be obtained.)

When one states such a simple proposition in such plain language, a number of obvious cross-examination questions arise at once. Is it not pos-

[6] Throughout this discussion we assume that each of the potential anticompetitive effects identified is equiprobable. This, of course, is a simplification, since as a rule some distinction between more and less likely effects can be drawn. The assumption of equal probabilities may be interpreted as an estimate of the *average* probability among the group of potential events. Alternatively, one might take specific (unequal) probability estimates into account, and compute the probability of obtaining at least one anticompetitive effect from them directly.

sible that such mergers may also yield some pro-competitive effects? The answer, of course, is "yes" — followed by two qualifications: (1) the statute makes no exception for mergers that tend to reduce competition in some areas and increase it in others, and (2) the pro-competitive effects may be attainable without the merger or, through partial divestment, without the anticompetitive effects.[7]

A second question: is it not possible that the same anticompetitive effects might arise as a result of internal expansion and diversification? The answer again is "yes"; and if such effects do occur (actual, not simply potential) as a result of internal growth, they may be examined under existing law. However, the Clayton Act specifically proscribes changes that *may* (not must) lessen competition only if they occur through mergers. The distinction in this context between structural changes associated with mergers and those associated with internal growth is perfectly sound. Large mergers result in discontinuous and frequently numerous and non-reversible changes in the organization of economic activity. These changes do not take place within an environment of continuous competitive tests and pressures, as would be encountered during a process of gradual internal expansion or serial accumulation of small acquisitions. On the contrary, the rapid and simultaneous occurrence of an entire group of organizational and ownership changes through merger may create conditions that insulate each (and therefore all) of them against competitive pressures in the future. Under these circumstances, detailed examination of the effects of such changes in all of the industries and markets involved — the examination implicitly required for the administration of the Clayton Act — is a kind of substitute for the competitive market tests that would have had to be passed repeatedly during a more gradual process of growth.

Thus, there is nothing inconsistent or embarrassing about the application of probabilistic tests (*may* rather than *must*) in merger cases. Indeed, the fact that the same structural change might be prohibited if it took place through merger, yet nevertheless permitted if it occurred as a result of internal expansion within a competitive framework, reveals a fail-safe mechanism that favors relatively strict application of the Clayton Act. If a

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[7] The current state of opinion in this regard is well reflected in the following colloquy between Judge Hubert Will and Dean E. V. Rostow:

> JUDGE WILL: Let's suppose that you are talking about two conglomerates in which the horizontal overlapping represents a relatively small portion of their total business, but which is clearly a horizontal combination which will make them dominant in a particular market area with respect to the particular product on which they overlap. . . . How would you interpret Section 7's application. . . ?
>
> DEAN ROSTOW: I have no trouble with that. . . . The statute says "any line of commerce" and unless the problem is cured some other way by disposing of the assets it would have to go in my view.
>
> JUDGE WILL: All right. That was my interpretation, too. . . . It was my impression that the tail can wag the dog.
>
> DEAN ROSTOW: Yes, the tail can wag the dog.

Record, at 2923-25, United States v. Northwest Indus., Inc., 301 F. Supp. 1066 (N.D. Ill. 1969).

proposed structural change reflects a response to fundamental economic pressures and opportunities (and does not offend other statutes), it can always be brought about through internal growth. However, if the change is allowed to take place through merger, and it *does* lead to anticompetitive effects, then the remaining forces of competition may not be strong enough to correct it.

Probable Merger Effects: An Application

It has now become customary to identify three principal sources of anticompetitive effects that may arise as a result of conglomerate mergers:

(1) elimination of potential competition — both through the removal of the merging firms as potential entrants into each others' industries and, in some arguments, through the creation of "deep pocket" positions that deter entry by other firms;
(2) foreclosure — through the suppression of alternative sources of supply (or demand);
(3) reciprocity — through the creation of mutual purchasing and selling possibilities, which supplant competitive alternatives in other markets.

Each of these sources of anticompetitive effect must be assessed in terms of probabilities. How likely is it that the firm *is* a potential entrant (or even is *thought* to be by other firms)? In what way does its presence as a *potential* entrant affect behavior in the market? In what way would its *actual* entry affect behavior in the market? To what extent would certain markets be foreclosed, and to what extent would this foreclosure affect competitive conditions within them? How numerous and important are the reciprocity possibilities? Would they, in fact, be utilized? Would reciprocity, if practiced, result in significantly different and less competitive market conditions?

The anticompetitive effects of a particular large conglomerate merger might arise from any or all of these sources, and there might be several specific effects of each type. The total number of such effects of all types, and their respective probabilities, should, of course, be taken into account in assessing the likelihood that some one or more effects that offend the law will occur. For purposes of analysis and illustration, it seems desirable to develop the argument somewhat further with respect to one type of potential anticompetitive effect. Therefore, I have selected for further discussion and application an aspect of conglomerate mergers that is the subject of considerable current commentary, but relatively little investigation — reciprocity in buying and selling.

Reciprocity

Reciprocity is the practice of mutual purchasing and selling between pairs of business enterprises, such that each reciprocating firm is both a

customer and a supplier of its reciprocity partner, and vice versa. Reciprocity can take place only under certain structural conditions, *i.e.*, that the pairs of enterprises involved have need for each other's outputs as inputs for their own economic activities.[8] Where these structural conditions exist, the decision to practice reciprocity rests with the managerial units concerned. And where reciprocity is actually practiced, its impact on the industries involved depends upon the activity-structure and size of the reciprocating units, the strength of competitive forces in their various markets, and other factors.[9]

The identification of circumstances under which reciprocity *may* take place is an important first step in the analysis of the extent and impact of actual reciprocity practices. Indeed, if reciprocity is a common practice, and if one is interested in the potential reciprocity effects that might arise as a result of changes in the ownership and activity structure of business enterprises — as, for example, through diversification — then the identification of reciprocity possibilities may be a valid subject of investigation in itself.[10]

Input-Output

The basis for our analysis of reciprocity possibilities is an input-output table. Such a table is constructed by classifying the activities of the economy into a number of discrete industries, and then tabulating the volume of interindustry purchases and sales. For any industry classification system of N industries, there are N^2 cells in such a table, many of which contain only zero (*i.e.*, there are no input or output relationships among the two industries involved). Others contain entries of such a small magnitude that they should be treated as zero for analytical purposes. Table II shows an input-output table in schematic form.[11]

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[8] Instances of indirect reciprocity, in which a third firm serves as a pass-through for reciprocating transactions, are sometimes observed; however, this special case does not appear to require detailed attention here.

[9] For an authoritative discussion of the conditions under which reciprocity is an attractive business policy, see Ammer, *Realistic Reciprocity*, 44 HARV. BUS. REV. 116 (1962); Simon, *Industrial Reciprocity as a Business Strategem*, 7 INDUS. MANAGEMENT REV. 27 (1966). For the most recent comprehensive discussion of the practice of reciprocity, see F. FINNEY, WE LIKE TO DO BUSINESS WITH OUR FRIENDS: A SPECIAL REPORT ON RECIPROCITY (1969).

[10] In at least one instance, a commercial service was initiated to provide firms with potential supplier-customer lists, together with estimates of potential purchase-sales data. The particular venture referred to (sponsored by IBM) was subsequently cancelled, reportedly for cost and technical reasons. *See* BUS. WEEK, Mar. 30, 1968, at 118, col. 1.

[11] *See, e.g.*, U.S. DEP'T OF COMMERCE, SURVEY OF CURRENT BUSINESS (1965). A modified form of the table, containing more recent data, has been developed by *Fortune*. A much more detailed table will be released by the Department of Commerce in the near future. We do not argue here that the particular set of industry definitions used in these, or any other, available input-output tables is necessarily appropriate for the identification of reciprocity possibilities in any particular industry or firm. Rather, it is the format of the table that is relevant to this analysis, and the available data are used for illustrative purposes only. However, it should be noted that the larger the individual firm within any specific industry classification, the more likely it is to reflect in its individual activities the input-output structure of the industry classification to which it is assigned.

TABLE II
SCHEMATIC INPUT-OUTPUT TABLE

Inputs read down; Outputs read across		Industries								
		1	2	3	. . .	i	. . .	j	. . .	Total
Industries	1									
	2									
	3									
	.									
	.									
	.									
	i							cell ij		
	.									
	.									
	.									
	j					cell ji				
	.									
	.									
	.									
	Total									

Reciprocity Possibilities Between Industries

We define the term "reciprocity possibility" to mean the occurrence of significant entries in *each* of the *pair* of cells linking two industries. For example, if "cell *ij*" contains the output of industry *i*, which is an input into industry *j*, and "cell *ji*" the output of industry *j*, which is an input into industry *i*, then the appearance of significant transactions values in both cells would identify a reciprocity possibility between industries *i* and *j*.

For any specific industry, the number and identity of reciprocity possibilities could be determined by inspection of the table. It is useful, however, to consider the typical and probable numbers of such possibilites that might arise for industries and firms selected at random, and from various possible combinations of multi-industry activities. At the outset, we assume that all firms in each industry are alike, so that each firm in each industry encounters each of the reciprocity possibilities available to that industry. This assumption will be modified below.

We define the number of industries from which any one industry obtains inputs as x_1, and the number of industries to which it distributes output as x_2. The minimum value of both x_1 and x_2 is unity, since the construction of the table requires that each industry obtain supplies from, and distribute output to, at least one other industry. The maximum value for x_1 and x_2 is $N-1$; that is, each industry *could* have input and output relations with every other industry in the table. Evidently, if *either* x_1 or x_2 is equal

to N−1, then reciprocity possibilities are certain to occur; their number will be equal to the smaller of x_1 or x_2. In addition, if *both* x_1 and x_2 are greater than $(N-1)/2$, reciprocity possibilities are also certain to occur. Their *minimum* number is the smaller of x_1 or x_2 *minus* the difference between N − 1 and the larger of x_1 or x_2. (For example, if $N-1 = 10$, $x_1 = 7$ and $x_2 = 6$, the minimum number of reciprocity possibilities is 3.)

To deal with the intermediate and more interesting cases, a more general formulation is required. The probability that any one industry will obtain inputs from any one other industry is given by $x_1/(N-1)$, and the probability that any one industry will distribute its output to any one other industry is similarly $x_2/(N-1)$. Therefore, the probability that any one input or output industry will prove to be a reciprocity possibility is given by the following:

$$p = \frac{x_1 x_2}{(N-1)^2}.$$

To illustrate, imagine an 11 × 11 input-output table. Any one industry in the table might deal with up to 10 input and 10 output industries. An industry dealing with only one of each would have a 1/100th chance (1/10 × 1/10) of encountering a reciprocity possibility on a purely random basis. An industry dealing with two input industries and one output industry would have a 2/100 chance, etc. The probability that an industry dealing with five input and seven output industries would encounter a reciprocity possibility in any single industry contact is given by:

$$p = \frac{5}{10} \times \frac{7}{10} = .35.$$

The number of such contacts in which a reciprocity possibility might arise is five (the smaller of x_1 or x_2). Therefore, the probability that at least one reciprocity possibility will occur is .8840 (see Table I; $p = .35$ and $n = 5$). The probability that specific numbers of reciprocity possibilities will occur can be obtained from the more detailed tables from which Table I is derived. For example:

Probability of one or more	.8840
Probability of two or more	.4694
Probability of three or more	.1607.

Illustration with 1958 Data

We apply this analysis to the estimation of reciprocity possibilities in the United States economy on the basis of data from the 1958 Department of Commerce input-output table. The table contains 87 industries, of which 63 are goods-producing.[12] Our analysis is confined entirely to the 63 × 63 portion of the total table.[13]

[12] Industries 1-64, omitting industry 11 (New Construction), for which no outputs to other industries are shown.

[13] Reciprocity possibilities are quite general among goods-producing industries. Among

The average number of interindustry transactions flows for the 63 industries is approximately 42. (Transactions involving excluded industries, as well as intraindustry transactions, are not included in this analysis.) The number of flows in which individual industries are engaged varies widely, as does the volume of transactions involved. For analytical purposes, our interest focuses on the transactions of $5 million and over, which amount to about half of all input-output flows. The average number of these per industry is thus approximately 21. As the detailed data in Table III show, well over half of all industries had more than 35 input and output industry contacts. However, about half of the industries had 20 or fewer contacts involving $5 million or more. For the five-unit intervals in which the data are tabulated, the most frequent interval for input contacts of $5 million or more was 16-20, and the most frequent for output contacts was 11-15. Variation among industries in the number of inputs is substantially less than variation in the number of outputs; 60 percent of all industries have input transactions of $5 million and over with 16-30 other industries. The number of significant output transactions per industry shows no similar concentration.

For illustrative purposes, we estimate the probability that reciprocity possibilities will occur (as indicated by interindustry reciprocal transactions of $5 million or more) for an industry chosen at random from the table ($x_1 = x_2 = 21$):

$$p = \frac{x_1 x_2}{(N-1)^2} = \frac{21 \times 21}{(63)^2} = \frac{411}{3969} = .11.$$

Referring back to Table I, and extrapolating, we surmise that the probability of at least one reciprocity possibility occurring under these circumstances is approximately .88. In fact, from the background tables, the probability that two or more will occur may be estimated at about .7.

Since the number of output transactions is substantially more variable than the number of input transactions, it may be of interest to estimate the number of reciprocity possibilities for a relatively low number and a relatively high number of output industries, to indicate the range of variation involved. For $x_1 = 21$ and $x_2 = 13$, $p = .069$, and the likelihood of one or more reciprocity possibilities is about .5. For $x_1 = 21$ and $x_2 = 28$, $p = .148$, and the likelihood of one or more reciprocity possibilities is about .97.

These results show that for any industry selected at random from the 63 × 63 table, there are almost 9 chances out of 10 that it will be linked with at least one other industry in such a way as to give rise to reciprocity possibilities. If the randomly selected industry is engaged in a relatively small number of input or output contacts, the probability will be less; and

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the excluded industries, some — such as finance and distribution — are also known to give rise to reciprocity, but not always in ways that would be revealed in this type of data. Other excluded industries, such as business services and government, are not generally subject to reciprocity relationships.

TABLE III
NUMBER AND PERCENTAGE DISTRIBUTION OF INPUT AND OUTPUT CONTACTS PER INDUSTRY, 63 x 63 INPUT-OUTPUT TABLE, 1958

Type of Contact	Total		$5 million and over	
	Number	Percent	Number	Percent
Input				
Number of Industries				
0-5	0	0	2	3.2
6-10	0	0	5	7.9
11-15	0	0	7	11.1
16-20	2	3.2	23	36.5
21-25	0	0	4	6.3
26-30	4	6.3	11	17.5
31-35	6	9.5	7	11.1
36-40	14	22.2	3	4.8
41-45	11	17.5	1	1.6
46-50	15	23.8	0	0
51-55	10	15.9	0	0
56-60	1	1.6	0	0
	63		63	
Output				
Number of Industries				
0-5	3	4.8	8	12.7
6-10	2	3.2	6	9.5
11-15	3	4.8	14	22.2
16-20	0	0	7	11.1
21-25	1	1.6	6	9.5
26-30	4	6.3	7	11.1
31-35	5	7.9	4	6.3
36-40	10	15.9	1	1.6
41-45	3	4.8	5	7.9
46-50	6	9.5	3	4.8
51-55	4	12.7	1	1.6
56-60	22	34.9	1	1.6
	63		63	

if it is engaged in a relatively large number, the probability will be greater. The probability of encountering specific numbers of possibilities — two, three, etc. — varies accordingly. For example, in the 21-28 industry case above, there is a probability of approximately .6 that *four or more* reciprocity possibilities will arise.

Reciprocity Possibilities Between Firms

Available input-output data are based upon rather gross industry classifications, with the result that business enterprises grouped into the same industry category may be quite dissimilar. The forthcoming Department of Commerce table[14] based upon 370 industry categories will represent a substantial improvement in the quality of the data. In addition, as noted

[14] *See* note 11 *supra*.

above, the fact that our analysis is concerned primarily with large firms increases the usefulness of data of whatever level of detail, since the larger the firm the more nearly should its individual characteristics be reflected in the characteristics of the industry group to which it is assigned.

It may nevertheless be desirable to make some allowance for the possibility that individual firms within industry classifications typically engage only in some portion of the input-output contacts of the classification as a whole. A crude approach would be to assume simply that the typical firm encounters only some fraction of the reciprocity possibilities of its industry. A more careful approach would take into account the typical numbers of input and output contacts *per firm*, and then estimate the probability of reciprocity possibilities occurring from these data. For example, if a typical firm engaged in only half (say, 10) of the industry average of 21 input and output contacts, then the probability would be computed as follows:

$$p = \frac{10 \times 10}{3969} = \frac{100}{3969} = .025.$$

The probability that a reciprocity possibility will occur in these circumstances is only about .3.

These rough computations suggest the basis for developing standards against which the number of actual reciprocal buying-selling relationships in which an individual firm or industry is involved might be appraised. From a distribution of actual industry and firm reciprocity possibilities, the likelihood of any particular number — and/or any particular minimum value — of potential reciprocity contacts could be estimated. Further, against this general background, account could be taken of particular technological, locational and other factors underlying interindustry relationships in particular instances. On this basis, the extent of potential reciprocity that might be characterized as "normal," "high" or "low" in particular industrial settings could be identified.[15]

Impact of Mergers

We are now in a position to estimate the impact of diversification mergers on the occurrence of reciprocity possibilities among firms. Paradoxically, the less the successive diversification activities are related, the greater the likelihood that new input and output industries will be introduced as a result of merger, and therefore the greater the increase in the probability that potential reciprocity contacts will arise. Thus, if a single-industry firm with, say, 10 input and 10 output contacts with other industries — and thus a .3 probability of encountering any reciprocity possibilities in a 63-industry economy — should acquire a firm in another industry with an equal

[15] An empirical analysis of actual reciprocity possibilities as revealed in this type of data has been deferred pending the publication of more recent and more detailed input-output tables.

number of different buying and selling industry contacts, the overall probability of potential reciprocity relationships rises to .88. A second such acquisition, yielding a total of 30 input and 30 output industries, makes the occurrence of reciprocity possibilities a virtual certainty; indeed, the occurrence of 5 or more such possibilities can be predicted with probability greater than one-half.

The likelihood that vertical integration, and hence possible foreclosure situations will arise through merger can be handled analogously. The number of industries that might be involved is the unduplicated sum of x_1 and x_2 (*i.e.*, the total number of input-output contact industries, net of any reciprocity possibilities). The likelihood that any particular industry will be selected for diversification is $1/(N-n)$, where n is the number of industries in which the firm is already engaged. Therefore, the likelihood that a foreclosure possibility will occur as a result of random diversification is:

$$P_F = \frac{x_1 + x_2}{(N-n)}.$$

CONCLUSION

These estimates, of course, relate only to the probability that reciprocity possibilities, or foreclosure possibilities, may arise as a result of diversification mergers. They do not demonstrate that advantage will be taken of all such possibilities, nor that the practice of reciprocity or integration will of necessity lead to such a reduction in the strength of competitive forces as to violate the law. There is, however, every reason to believe (and even to hope!) that business executives and employees will use every legitimate means available to improve the cost and profit positions of their organizations. Therefore, it should be anticipated that purchasing and selling opportunities based upon reciprocity and other changes associated with diversification will be increasingly monitored and, where profitable, utilized.[16]

How likely is it that such practices will substantially lessen competition? Clearly the answer here depends upon the volume of transactions involved, the range of choice and variety of adaptive possibilities remaining in the market sectors affected, the likelihood that other firms and industries will duplicate the changed pattern of behavior so that a permissible exception becomes the standard practice, and so forth. These conditions are difficult to assess in detail in the numerous industries, markets and sectors of the country that may be affected by changes growing out of any large conglomerate merger.

Detailed examination of these conditions in industries and markets of

[16] For a stimulating discussion of the sophisticated state of current industrial marketing analysis and likely near-term developments, which contain very clear implications for reciprocity practices, see T. LEVITT, THE MARKETING MODE: PATHWAYS TO CORPORATE GROWTH 292-98 (1969).

obvious significance for particular acquisition cases will undoubtedly continue to be an essential aspect of merger analysis and litigation, along with the careful tracing of structural and behavioral changes likely to arise in these markets as a result of changes in business organization and ownership. However, it is the argument of this paper that beyond such salient instances, the emphasis of documentation and analysis in conglomerate cases should shift toward a survey of the number of different situations in which anticompetitive consequences may arise. On the basis of such a survey, a large conglomerate merger might be shown to give rise to, say, four or five potential reciprocity possibilities, one or two instances of potential foreclosure, and one or two situations in which sources of potential competition have been eliminated. Such a merger would thus be said to have potentially anticompetitive impact on six to nine spheres of market activity. If these potential impacts are independent of each other, and if the average probability of their individual occurrence is greater than .10, then the probability of at least one of them actually occurring is one-half or greater. Thus, in these circumstances, the occurrence of an anticompetitive effect as a result of the merger is more likely than not.

Each of the principal aspects of this analysis — the number of potentially anticompetitive impacts, their individual probabilities, and the overall probability of one or more significant effects — might be taken into account in individual cases and in the development of more general judicial standards. The argument of this paper is not cast in terms of any specific standard, but rather in terms of the analytical approach and criteria that should be applied. Although the steam may be gone from the conglomerate merger movement for the time being, there is no reason to suppose that it will not resume with greater momentum during the next period of general economic expansion. The current lull provides an opportunity for the development of valid analytical approaches and judicial criteria for the future.