the Gini index, a widely used measure of inequality, which ranges between 0 (equality), and 1 (maximum inequality), can be derived. The Gini index, G, is equal to

$$\text{Gini} = G = \frac{1}{1 + \frac{2}{(g-1)d}}.$$

Due to the appearance of d in the equation for G, interpretation for inequality in the topology of market structure is the clearest for the limiting cases of 90° and 45° lines running through (1,1). Approaching the 90° line (where $a/c = 1$), g heads toward infinity so G heads toward 1, or maximal inequality. Approaching the 45° line, g heads toward 1 so G heads toward 0, or equality. Intermediate values of G between these two limiting lines will, of course, depend on d, but given a constant d, one gets a gradual transition from maximal inequality to equality as one rotates from the 90° to 45° line through (1,1). Hence there is the full gamut of possibilities for inequality in market share or profits across markets. Figure 11.5 graphs these possibilities, for $d = 1$.[12]

To get some intuitive feel for this measure, consider that inequality in pay in a typical business hierarchy of managers might be about .2, inequality in earned income in a Western society might run about .4, and the Gini for inequality in some major forms of property, say agricultural land in traditional societies or capital ownership in ours, could go as high as .8 or more.

The Gini index for actual revenue outcomes in the frozen pizza market is .283, a considerable but not extreme degree of inequality. Though the assumptions used to derive the analytical Gini index results are not strictly met in the actual frozen pizza market, the analytically derived prediction for inequality is .255, close enough to suggest that the analytic results might be quite robust. The frozen pizza market is demarcated in the sea of possibilities charted in figure 11.5. Each location in figure 11.5 carries with it a distinct reality that is analytically sliced from many angles by interested onlookers and lived in by producers like Tony and others. Figure 11.5, however, is offered as a potent illustration that real-life diversity may share a common underlying processual logic.

In this section, we have moved a long way from Tony and his operating concerns. Tony makes his production decisions in the framework defined by the decisions of other producers, whose products and production options are comparable, but differentiated, from his. Tony and the other frozen pizza producers share a common context of costs and valuations which shapes the way their market will function and respond to exogenous changes, and which shape the inequality in their outcomes. In this section, we have moved to the level of a topology of market contexts in which diverse markets can be placed. The basic structuralist credo holds at this level with equal force:

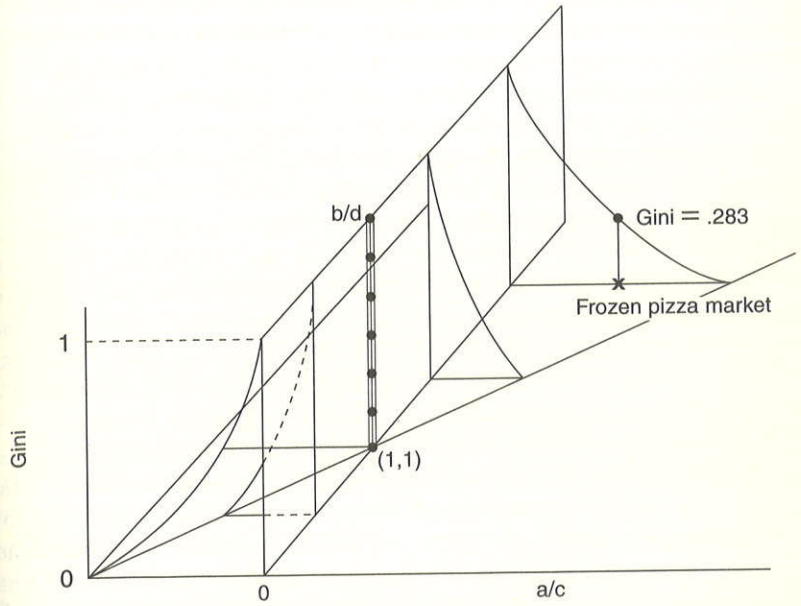

FIGURE 11.5 Outcome inequality. Gini measures of revenue outcome inequality are graphed over the topology of stable market contexts. Inequality approaches 1 along the vertical $a/c = 1$ (though it is not defined over $a/c = 1$). Equality holds where $a/c = b/d$ (i.e. Gini = 0). The point (1, 1) is a "black hole" where the lines of maximal inequality and equality intersect.

position in a topology of market contexts constrains the functioning of a market, just as position in a market constrains ("voluntaristically") the decisions of producers.

DISCUSSION

The model presented here defines the structural context of producers by referring to the relations among producer outcomes. The shape and location of the structural context of market activity are dependent on specific sets of producers, and cannot be defined apart from them. The structural context of a schedule of niches sums up market possibilities and thereby provides a guide for producer behavior. In a viable market, producer behavior is guided in such a way that it functions to reproduce the structural context from which it derives. Our model provides the conceptual and mathematical conditions for self-reproducing structural contexts, and thus delimits the variety of markets which can be empirically observed. Reproducibility therefore be-

comes the central issue in characterizing markets and understanding market behavior. In this section, we contrast this structural approach with the information orientation which dominates economic analyses of markets.

Information approaches are driven more by the questions producers ask than the way they go about answering them. Each producer, in a differentiated market, wants to know the unique demand curve for his product. That is, he wants to know how much he can sell at any given price. Furthermore, the producer's questions are asked in *ex ante* terms—he wants to know what *will* happen. Given this question, economists and marketing consultants have focused on the kinds of information and theories needed to provide an answer. Firm-specific demand curves can be estimated from prior firm outcomes, yet this estimation depends on the assumption that the demand curve *does not change (or changes predictably) over time* (Intriligator 1978), *and such estimation ignores interdependencies between producers.*

If these interdependencies are to be taken into account, assumptions must be made about how other producers *will* react to the focal companies' price-quantity decision, and further assumptions must be made about the cross-product elasticities which guide the consumers' selection among producer offerings. An *ex ante* focus on all these interdependencies requires much more information and many more theories to define the possibilities that face each producer. An answer to the simple question asked by producers therefore invariably requires invoking a whole series of assumptions which inspire little confidence because they are based on mathematical convenience rather than empirical plausibility. A definitive answer has therefore not been found, and if left to be provided by the theory of games, it does not look like one will be found (see Shubik 1982; Smith 1982).

One might wonder why the producer's simple question is so central if the solution is intractable, or at best dependent on such arbitrary assumptions. Producers, after all, seem to function in the absence of a clear answer, and few would claim that markets must be fully understood (in the form of explicit theory) in order to operate.

A solution to this dilemma comes from recognizing the link between the producer's question and the idea of efficiency. If we view the producer as situated in a visible spectrum of evaluatable alternatives, efficiency can become a relevant concern. The wider the range, the more relevant is the idea of efficiency in rationalizing actions (see Granovetter 1985 for a critique of the centrality of efficiency in economic thought). Answers to the question of what will happen must cover all real-world possibilities for efficiency to be relevant. The producer's ultimate choice must be set against a backdrop of possible, yet less desirable, behaviors. This circumstance simply does not occur in the real world.

The problem with focusing on the hypothetical producer's question is that it stands in the way of discovering any distinct reality associated with a "market." Firm-specific demand curves divert attention from markets altogether.

Yet the producer's reputation, behavior, and possibilities may be defined, as we have claimed, purely from the standpoint of the producer's relation to other producers in a "market." These relations are knowable (observable) only *ex post*, from market structure, or what has worked in past periods. An "orderly" market structure therefore reflects the interdependencies in the market, *ex post*. When the producer is viewed from the standpoint of the market, these "ex post" interdependencies—already observed in the previous production period—replace speculated gaming interdependencies and cross-product elasticities—which are assumed in some a priori manner.

The producer's position and possibilities are defined in terms of these *ex post* interdependencies that make up market structure. This central feature of structural analysis is lost when we lock ourselves inside a hypothetical producer's *ex ante* point of view and attempt to depict *ex ante* possibilities that lie outside of observed *ex post* interdependencies. In our structural approach, producer behavior can be understood only from the point of view of the market. The "market" assumes a distinct reality of its own, and it provides guidance to producers. Rather than being a consequence of solutions to producers' *ex ante* speculations, it is an empirical premise derived from past production periods.

In stepping outside a hypothetical producer's *ex ante* point of view, efficiency ceases to be well defined. A wide range of market structures becomes possible for any particular set of producers, the particular structure that appears being partly determined by historical accident (K) and scale indeterminacies (θ). The varying structures will be associated with varying levels and dispersions of profits across producers. In most cases, producers will make positive profits; and different profit levels will exist across producers as stable features of the market. The "zero profit" criteria for "equilibrium" markets that economists insist upon has no place in the proposed structural approach. The positions of producers in a market, with their distinct profitability implications, must be treated as givens. For this treatment of position to be useful, positions must be stable, else the structural context of interrelated positions could not provide a useful source of guidance.

Reproducibility, not efficiency, is the relevant issue in structural analysis. The range of possibilities is defined by the structures in which position holders operate. It does not extend beyond these *extant* structures, as would be needed to assess the abstract efficiency of a structure. Given the narrow and well-defined range of possibilities that defines a reproducible structure, the behavior of position holders is self-fulfilling. It functions to maintain their position within the structure. Figure 11.4 showed that not all imputed market structures are reproducible in this sense. Clearly if the behavior of "position holders" serves to undermine positions and structure, then the reality of "position" and "structure" as observer constructs must be suspect.

In our model, markets are real structures with definite boundaries. Producers are position holders whose behavior reaffirms their position in the mar-

ket, marked by a distinct reputation in the "culture" associated with a market. Positive and unequal profits are facts-of-life institutional details for most markets. This treatment of markets as real structures contrasts sharply with the (neoclassical) economist's treatment of markets as a convenient analytical device for drawing inferences about the "economy," or systems of markets. It also contrasts with most applied economics treatments (e.g. Porter 1980), which treat markets as loosely defined arenas for strategic (*ex ante*) ploys. Our model tries to combine some of the analytical rigor of the economist with some of the institutional realism of the business professor. Markets become a realistic device that can be used by concrete producers and studied by researchers.

Notes

1. It should be stressed that, unlike functionalism, structural analysis does not assume that a social arrangement is self-reproducing. Integral structural contradictions can produce ongoing conflict and change—or even destruction—of a social institution. This point is elaborated below.

2. We assume Tony treats the retail customer as the "consumer," as opposed to the distributors and/or retail outlets which buy pizzas directly from him. Tony allows a standard markup for these outlets in arriving at the price he will charge them, and thus absorbs the costs and benefits from market fluctuations. Other arrangements are certainly possible. Defining the "consumer" must involve careful consideration of the distribution channels for a product, with regard to the pricing, packaging, and marketing responsibilities of each concern that handles the product.

3. Since revenues equal price times volume, this is analytically identical to describing the dimensions as volume and price. In our formulation, we use γ (volume) and W (revenue).

4. In advocating structural over information approaches, our argument largely rests on the "publicness" of information and not its presence or absence. The advantage of the proposed structural approach is that it assumes actors act on the basis of information that is readily obtainable, through informal communications, trade association publications, marketing reports, and the like. (We do not assume a producer knows the other producers' costs, which are not easy to obtain—and present difficulties for the researcher in estimating parameters for a market.) Information approaches, in adopting an *ex ante* point of view, tend to freely assume the availability of "private" information that has no tangible existence in the producer's operating world.

5. We treat cost differences as exogenously determined. They could result from the use of different production techniques, factors of production, labor rates, locations, etc. If one envisions, however, the formation of a market as a trial-and-error process, where products and images are put before the consumer and either received or rejected, initial cost differences might be related to initial role perceptions of the producers. That is, the producer who perceives he is slipping into a definite market role (e.g. as a high-quality producer) may alter his product or its image (e.g. packaging), and hence its costs, in a way that conforms to the perceived role. Cost differences, and their relation to valuation differences (see below), cease to be so mysterious when viewed in this light.

6. To get unique estimates for g and d, the range of g_i must be arbitrarily fixed. The interval selected for the lowest and highest g will determine how d is interpreted (e.g. if a "large" interval is selected, then a "small" d may still mean there is some differentiation in cost structures between producers).

7. The second-order condition ensuring maximization (equation 11.4), and the condition that producers require positive profits to produce, correspond to the satisfaction of the two inequalities below:

$$(cd(a-c)/(bc-ad))\ y^{(bc-ad)/b} > -adK/bq(\theta/r)^{d/b}$$
$$(d(a-c)/(bc-ad))\ y^{(bc-ad)/b} > -K/q(\theta/r)^{d/b}.$$

8. This assumption obviously downplays the importance of marketing research in production and pricing decisions within a stable market context. Much marketing research, however, is used for other purposes anyway, like exploring potential market areas or at least legitimating already made decisions to enter new areas. If some routine production and pricing decisions are based on marketing research, the error that might be introduced in ignoring this research (assuming its conclusions differ from those of the unaided producer) is small, we claim, relative to the error and intermediacy we would face in conceding that production and pricing decisions *are* based on marketing research.

9. Value can be viewed as measurable in dollar units. In discussing aggregate value and revenue later, we suggest the assumption that aggregate value equals aggregate revenue provides a convenient calibrating device. Thus if $240 million is spent on frozen pizzas annually, we assume that all the frozen pizzas purchased are "worth" $240 million to the aggregate consumer. The difficulties entailed in actually measuring this "worth" motivated the first author to design techniques for estimating market parameters without directly measuring value (see Leifer 1985). The researcher, however, has to make an assumption about how much valuations differ across products (b) and, without data for multiple production periods, an assumption about the aggregate satiation (γ), a factor discussed later.

10. This imagery stands in sharp contrast to the fluidity of competitive markets in economics (aside from Chamberlain 1933), where only the aggregates matter. The distinct reputations of producers are not "frictional" effects in the $W(y)$ model, but the basic building blocks of markets.

11. This potential is dependent upon a/c being greater than $1/\gamma$. The γ dimension, however, can be suppressed for present purposes.

12. The point (1,1) is a sort of "black hole" in the topology of market structures. It is the point where the lines of maximal inequality and equality intersect, and hence represents a most peculiar situation. Mathematically, a Gini index is not defined at the (1,1) point, and no stable market is possible there either. At the (1,1) point, spreads on cost and value between producer goods are identical for producers and consumers, respectively, as are sensitivities to shifts across production volumes. Why this symmetry in spreads and shift sensitivities between producer and consumers precludes a stable market is a puzzle we must leave to the reader to solve. The solution to this riddle may give insight into the prerequisites for interfaces in general which tie together two distinct sides.

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