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**MEASURING MARKET PERFORMANCE:
QUANTIFYING THE NON-QUANTIFIABLE**

by

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WP-15

March 1978

The tabular material in this paper was prepared for and discussed at a meeting of the Fruit and Vegetable Subcommittee, NC-117, February 2-4, 1976, at Madison, Wisconsin. Comments by Bruce Marion on an earlier draft of the paper are gratefully acknowledged.

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Introduction

"Economists asked to appraise the economic performance of an industry have a difficult task. If they confine themselves to the elegant abstractions of rigorous general theory, they find few handles by which to grasp the inelegant real world and are wholly unprepared for some of the institutional and dynamic characteristics of the industry. If they adopt the approach of industrial organization economics, they find standards imprecise, measurement, both conceptually and empirically difficult, and judgments usually necessary to reach conclusions. Yet to insist on elegantly derived results that are fully conclusive and leave no room for judgment, is to require the impossible. The facts are that *good performance* is a set of sometimes conflicting goals; the economic world is complex, changing, and never fully knowable; and the economic results of interest range along continuous scales from good to bad rather than being clearly one or the other. Economists must accept this if they are to produce valid information, and the public must accept it if effective use is to be made of such information for policy purposes." (Brandow, p. 81)

George Brandow's observation on measuring performance may seem like a pessimistic way to begin a paper on the topic. The last twenty years have seen an increasing interest in evaluating market performance paralleled by even more rapid growth in the level of sophistication of mathematical and statistical tools to measure and analyze economic phenomenon. Yet empirical assessment of performance and comparisons among and between industries are noted only infrequently in the literature. This paper explores some of the problems underlying performance measurement and proposes a set of measures which would appear to have some usefulness in empirical performance research.

Evolution of Performance Criteria

Since 1959, with publication of the first edition of Bain's seminal book on industrial organization, several authors have outlined dimensions of market performance which must in some way be measured to evaluate a particular industry or make comparisons among industries. Criteria proposed by five writers are shown in Table 1.

Joe Bain defines two sets of performance dimensions; one relating to market performance and another relating to performance of the economy in aggregate. Bain argued that satisfactory performance of the economy ("workable competition") would result from satisfactory performance at the market level. Consequently, he stressed the market performance dimensions in his subsequent discussion.

Six of Sosnick's twelve performance dimensions are identical with those outlined by Bain. Sosnick added exchange efficiency to technical efficiency and included unethical practices, participant rationality, conservation, external effects, and labor relations as dimensions of market performance. His inclusion of conservation and external effects explicitly recognized the importance of externalities in assessing performance. Based on this list, Sosnick later developed a set of 25 undesirable market characteristics which preclude workable competition in an industry (Sosnick, 1968). In essence, this list represented negative extremes with respect to the performance dimensions.

Performance dimensions proposed by Hildreth, Krause and Nelson include three forms of efficiency: technical, economic, and pricing. Conspicuously absent from this set is profits. Like Sosnick, Hildreth, Krause and Nelson define the nature of externalities as an important dimension of performance. They include income and power distribution, a dimension of aggregate economic performance in Bain's terminology. Since this set of performance dimensions is specifically designed to assess changes in subsector organization, the extent to which a change is consistent with the values of the market participants is also included as a

Table 1. --- Selected Sets of Criteria for Evaluating Market Performance

	Bain (1959)	Sosnick (1964)	Hidreth, Krause and Nelson (1973)	Padberg (1975)	Brandow (1977)
A. Market Performance	<ol style="list-style-type: none"> 1. Technical Efficiency 2. Profits 3. Output (relative to "efficient" capacity) 4. Promotion Costs 5. Product Character 6. Progressiveness 	<ol style="list-style-type: none"> 1. Technical Efficiency 2. Progressiveness 3. Product Suitability 4. Profits 5. Level of Output 6. Exchange Efficiency 7. Promotion Costs 8. Unethical Practices 9. Participant Rationality 10. Conservation 11. External effects 12. Labor Relations 	<ol style="list-style-type: none"> 1. Progressiveness 2. Magnitude and Distribution of externalities 3. Efficiency <ol style="list-style-type: none"> a. technical b. economic c. pricing 4. Values of Participants 5. Income and Power Distribution 	<p><u>A. Quantitative</u></p> <ol style="list-style-type: none"> 1. Technical Efficiency 2. Profits 3. Promotion Costs <p><u>B. Qualitative</u></p> <ol style="list-style-type: none"> 1. Availability of Economy Alternative 2. Product Safety 3. Constructive Product Image 4. Adequacy of Consumer Information 	<ol style="list-style-type: none"> 1. Product Characteristics 2. Technical Efficiency 3. Progressiveness 4. Promotion Costs 5. Profits 6. Stability of Prices, Output and Employment 7. Fair Conduct 8. Price Coordination 9. Externalities
B. Economy Performance	<ol style="list-style-type: none"> 1. Volume of Employment 2. Efficiency of Production 3. Stability of Output and Employment 4. Rate of Growth of Output 5. Composition of Output 6. Distribution of Income 				

performance dimension.

Padberg's list of performance dimensions is unique in its brevity and in its distinction between quantitative and qualitative dimensions. The first three of Padberg's qualitative dimensions are concerned with product characteristics and thus consistent with Bain's definition of product character and Sosnick's product suitability.

Brandow's listing of performance criteria appears to be a synthesis of the list proposed by the other four writers. In particular, it combines some of Bain's aggregate economic performance dimensions with his market performance dimensions, explicitly recognizes externalities, and adds fair conduct as a "catch-all" dimension which incorporates many of the specific equity aspects noted by other writers.

In comparing the various sets of criteria for evaluating performance, one is struck by their similarity, particularly since nearly twenty years separate the sets proposed by Bain and Brandow. This would appear to be testimony either to the fundamental and farsighted nature of Bain's early writings, or to the lack of imagination of subsequent writers in industrial organization.

The Search for Norms

Designating evaluative criteria as dimensions implies performance can be measured with respect to some continuous or discontinuous scale. Many industrial organization writers argue that any measures based upon these criteria require specification of a norm or standard to which actual values can be compared. Much discussion has centered about specification of these norms. Bain defines norms for his aggregate economic performance measures, but is much less specific with respect to standards for market performance. A working group of the conference at which Sosnick proposed his performance dimensions attempted to provide consensus

norms for each of Sosnick's twelve criteria.^{1/} For the most part, the group was unable to specify precise standards. As emphasized by Marion and Handy, norm specification is fraught with problems of operationality, weighting, and reconciling conflicting goals and values.

Preoccupation with specifying norms may have contributed substantially to the literature in industrial organization, but has done little to further empirical measurement of performance. Brandow suggests that "waffling" in establishing performance standards has led to public confusion. He argues that "economists should be more willing to take the bull by the horns and to use specific standards in appraising performance." (p. 99) While generally agreeing with this position, I would argue that specification of a precise norm may be unnecessary; it would be considerably easier to achieve agreement on what is particularly good or bad with respect to a performance dimension. For example, if two similar industries have profit rates of 8 and 25 percent, comparison of performance along the profit dimension does not require specification of what is a "proper" profit level. Without a profit norm, it is not possible to assign a performance index to either industry, but this does not preclude discussing performance in a relative sense.

The Structure-Conduct-Performance Quagmire

Discussions of performance dimensions and performance in general were at one time inseparable from references to market structure and conduct. Seaver, for example, argued that "...performance should not be discussed in isolation from structure and conduct and vice versa." (p. 125) He further maintained that "economists have tended to view structure, conduct, and performance as independent areas of research. Such a view ignores reality and is a guarantee of useless research

^{1/} This workshop on "Market Structure Research," jointly sponsored by NCR-20 (Economics of Marketing) and the Farm Foundation, was held at Purdue University on June 18-20, 1962.

results. No one should be under the illusion that performance is anything but complementary with structure and conduct." (p. 126)

This strong warning to industrial organization researchers probably stems from Bain's hypotheses which "...predict in general that the market structure of an industry determines or strongly influences the crucial aspects of its market conduct and thus indirectly determines certain strategic dimensions of its market performance." (p. 430) However, it is important to note that Bain designates the relationship between structure and performance as hypothetical and subject to empirical testing. Further, he does not appear to insist that all aspects of economic performance are associated with structural elements.

Recently, some writers have questioned the structure-conduct-performance paradigm as a singular basis for evaluating market performance. Marion and Sporleder examined the structure-conduct-performance linkage as a basis for anti-trust policy. They state that the relationship between structure and performance is verified based upon a wealth of empirical evidence primarily concerning the relationship between concentration and profits. But they conclude their assessment on a less positive note:

"At this point in time, Bain's S-C-P model is the only well developed, and at least partially operational, theory on which to base anti-trust policy. However, this model provides limited guidance on several important anti-trust issues and, because of data and methodology problems, may never be adequately verified." (p. 871)

Brandow comments even more strongly on structure, conduct and performance interrelationships:

"The usefulness of inferences about performance obtained from studying the setting in which firms operate should not be built up to the point where knowledge of structure and conduct is assumed to tell all one needs to know about performance. There are other determinants of performance, and most relationships between structure and conduct on the one hand and performance on the other have low predictive power. Improved understanding of the determinants of performance depends on having independent, not inferred, evaluations of performance." (p. 97)

Brandow's questioning of the inseparability of structure and performance seems particularly relevant to defining performance measures. Specifically, I would argue that the structure-conduct-performance paradigm stifles creativity in establishing performance dimensions and measures. Market performance is an extremely broad concept. It does not seem reasonable to constrain its definition on the basis of hypothesized causal relationships.

Performance Measures -- Another Approach

Based on the discussion above, the task at hand is to propose a method of specifying market performance measures which is not constrained by precise norms or a priori causal links. Before moving forward, however, it is instructive to examine other shortcomings of existing performance measures to determine if additional pitfalls can be avoided.

Marion and Handy (p. 28) outline five fundamental weaknesses of performance measures. In general they:

1. Require some judgmental norm;
2. Are difficult to combine into a single overall index of performances;
3. Concentrate on only limited dimensions of performance;
4. Are historical in nature, and not particularly useful for prediction;
5. Can be misleading with respect to causal relationships.

The first and second weaknesses noted are related. A norm is necessary if an absolute index of economic performance is desired, and some weighting process is necessary if individual indices reflecting different performance dimensions are to be combined into an overall index. If one is willing to settle for relative comparisons, then the problem of specifying precise norms is avoided at the expense of computing some overall performance index.

How large is this cost? I submit that it is at least negligible and possibly negative. Any weighting of individual performance measures is necessarily subjective and transcends the bounds of responsibility as typically defined for economists. Weighting of individual measures seems unnecessary. Economists

could (and, I argue, should) assume a positive stance, calculating and comparing measures along selected dimensions and permitting others to determine the relative importance of the dimensions. This is not "copping out." It is explicit recognition that in the process of formulating economic policy, the economist plays a single role -- a supporting role of providing sound analysis which permits ultimate decision-makers to know the costs of alternative courses of action. It is the economist's responsibility to clearly specify performance dimensions, but it is presumptuous to unilaterally designate their relative importance.

The narrow focus of existing performance measures is a valid and troublesome observation. There is a natural tendency to measure the easily measurable. Measures of profitability and, to a lesser extent, technical efficiency and progressiveness are more common because they can at least be quantified even if an unequivocal norm cannot be specified. The narrow focus criticism reflects difficulty in defining numerical values to correspond with generally accepted performance dimensions.

The historical nature of performance measures would also appear to be an inescapable attribute. But this may not be a severe limitation. The diagnostic value of performance measures is, to a large degree, independent of their predictive value. While we may not be able to forecast how a particular measure might change over time, this does not preclude us from using the measure to diagnose undesirable performance trends. The question of causal factors and appropriate prescription is a separate issue.

The misuse of performance measures to specify spurious or erroneous causal relationships is unquestionably a serious problem. While misinterpretation can probably never be completely avoided, it is the responsibility of the analyst to clearly specify limitations of performance measures, even to the point of providing explicit warnings with respect to anticipated abuse.

With this set of fundamental weaknesses in mind, we can proceed with identifying some specific performance measures. To avoid the norm and market structure constraints, it is necessary to first delineate a set of performance objectives or dimensions which can be cast in terms of "inalienable human rights." Such a task should not be assigned to mortals, let alone economists. However, it does seem possible to define a set of functions which an "ideal" economic system would perform. While the concept of ideal is subjective, a performance "bill of rights" acceptable to all but a few extremists seems plausible.

As such a bill of rights, I accept a list of performance objectives suggested by Shaffer. These generalized performance objectives are shown in the first column of Table 2. They are cast in terms of immeasurables and defy quantification in the form shown. I submit that they reflect an exhaustive specification of what an ideal economic system should accomplish.

Industry performance indicators implied by these generalized performance objectives are shown in the second column of Table 2. Like the performance objectives, these indicators are somewhat nebulous. On the other hand, they represent a lower level of generality and are subject to relative measurement. More specifically, performance extremes based upon these indicators can be specified. Possible extremes are shown in the last two columns of Table 2. While it might be argued that the performance extremes can be interpreted as positive and negative norms, they are not precisely defined and in most cases represent conditions not expected to be observed in real life. The extremes should be viewed as examples of inferior and superior performance based on the implied performance indicators.

Because they are cast in terms of specific conditions, the performance extremes necessarily involve subjectivity. A precise interpretation must be applied to the more broadly defined values in the generalized performance objectives. For example, such terms as abundant, reliable, rewarding, equitably, socially desirable, and effectiveness undoubtedly elicit different interpretations from different

people. But while arguments are possible, the performance extremes would seem to represent consensus views of unacceptable and acceptable performance.

In Table 3, an attempt is made to define quantifiable measures of the performance indicators noted in column 2 of Table 2. The measures shown vary greatly in how well they reflect the indicators. They vary even more with respect to measurability. Some could be calculated by using readily available published data, while others are only subjectively measurable even with extensive primary information.

The performance measures shown in Table 3 are only proxies for the performance indicators, which are less than perfect indicators of the generalized performance objectives. Hence, the decreasing level of generality results in increasing subjectivity in terms of how well and how precisely the measures reflect economic performance. For example, the generalized performance objective of assuring reliable food supplies seems unquestionably valid, but numerous questions might be raised concerning how well variance in quantity about a trend line (1-B (1)) reflects reliability of supplies. Variability due to weather and other random factors would not denote poor performance. Variability due to shifts in supply and demand would be desirable. Only systematic variability, attributable perhaps to the use of market power, would be deemed as exemplifying poor performance. Similar problems in interpretation are associated with most, if not all of the quantifiable measures in Table 3.

The measurability question is addressed by assigning an index to the quantifiable performance measures based on ease of calculation.^{2/} The index ranges in value from 0-10 reflecting increasing difficulty in computation. A discouragingly large number of the index values are in the six to nine range.

Casual inspection of Table 3 shows an inverse relationship between ease of

^{2/} The indexes shown are in most cases, consensus values of participants at a meeting of the Fruit and Vegetable Subcommittee of NC-117, Madison, Wisconsin, February 2-4, 1976.

measurement and reliability of the quantifiable measures shown. That is, there is an obvious trade-off between measurability and the extent to which the measure captures the flavor of the generalized performance indicator. For example, the ratio (price - marginal cost) divided by marginal cost is a theoretically desirable indicator of excess profits, as noted by many writers. However, this ratio can seldom, if ever, be calculated for real-life firms. It is associated with a measurability index of 9. Change in price compared to change in production cost in the long-run (1-C (3)) is a substantially less desirable indicator of excess profitability. Specifically, it ignores productivity changes, changes in demand, and changes in the distribution of plant sizes. However, in many industries, these values could be easily computed.

Conclusions

The quantifiable measures of economic performance suggested in this paper are not new, nor do they escape much of the criticism of existing measures outlined by Marion and Handy. Their uniqueness (if any) stems from two characteristics. The first relates to the manner of derivation. The measures are tied to a generalized social objective rather than an economic dimension. While this does not lead to a set of totally different indexes of performance, it does permit discussion and evaluation of performance outside the context of market structures.

Second, the measures offer alternatives with respect to ease of computation, explicitly recognizing trade-offs between measurability and accuracy in reflecting an implied objective. This is important for operationality. Specifically, it would seem possible to select a set of quantitative measures with low indexes of measurability which could be consistently applied to a group of related industries. This would permit relative comparison of economic performance over a broad spectrum of objectives, even though individual measures only imperfectly reflected the objectives.

Table 2. -- Performance Objectives, Indicators and Extremes

Generalized Performance Objective (Shaffer Bill of Rights)	Implied Industry Performance Indicator	Performance Extremes	
		Bad	Good
I. To assure an abundant and reliable supply of food at economical prices. To stimulate the production and distribution of sufficient food to provide the possibility of nutritionally adequate diets for all.	A. Quantity of product.	1. Monopolistic output restriction.	1. Output consistent with prices rendering normal profits to minimum efficient firms.
		2. Chronic overproduction with low prices or product destruction.	
B. Reliability of supplies		1. Large systematic intra- and interseasonal variability in supplies.	1. Intra- and interseasonal variability in supplies related to weather and other random factors.
		2. Plomaine in your tomatoes.	2. Assurance of product safety.

Continued.

Table 2. -- Performance Objectives, Indicators and Extremes - Continued

Generalized Performance Objective (Shaffer Bill of Rights)	Implied Industry Performance Indicator	Performance Extremes	
		Bad	Good
C. Price level and stability.		1. Wide seasonal and intra-seasonal price fluctuations.	1. Stable prices.
		2. Prices yielding supernormal or minimum efficient firms.	2. Prices consistent with normal profits of minimum efficient firms.
		3. Price trends inconsistent with trends in costs of production and trends in consumption.	3. Price trends consistent with trends in production costs and trends in consumption.
		4. Price discrimination in time or space or among product forms.	4. Temporal, spatial and product form price efficiency.
D. Nutritional adequacy.		1. Extensive production of product forms with low nutrient levels.	1. Research expenditures to improve nutritional levels of existing products and develop more nutritious products.
		2. Attempts to influence increased consumption of "empty calorie" product forms or products detrimental to health.	2. Advertising keyed to nutritional information.

Continued.

Table 2. -- Performance Objectives, Indicators and Extremes - Continued

Generalized Performance Objective (Shaffer Bill of Rights)	Implied Industry Performance Indicator	Performance Extremes			
		Bad	Good		
III. To create incentives for increased productivity in each activity of the total system.	A. Productivity.	1. Stagnant production process; investment limited to replacement of depreciated plant and equipment.	1. Frequent process innovations and rapid adoption of new technology.		
		2. No new product development or product proliferation with no distinctions except as created through advertising.	2. Periodic introduction of new products or product forms in response to consumer desires.		
		3. Production per man hour stable or declining.	3. Increasing production per man hour.		
		4. Extensive excess capacity.	4. Production facilities used at or near capacity.		
		5. Unexploited size economies.	5. Plant size distribution consistent with known size economies.		
		IV. To provide productive and rewarding employment opportunities in the system.	A. Level and type of employment.	1. Declining domestic employment; heavy use of illegal aliens.	1. Expanding total employment with job mix heavy on rewarding positions. Mechanization of menial or undesirable tasks.

Continued.

Table 2. -- Performance Objectives, Indicators and Extremes - Continued

Generalized Performance Objective (Shaffer Bill of Rights)	Implied Industry Performance Indicator	Performance Extremes	
		Bad	Good
V. To distribute rewards of the system fair and equitably. To especially assure that the consequences of government policies and programs are in the aggregate, fair and equitable.	A. Level of price spreads.	1. Value added or margins inconsistent with input costs.	1. Value added consistent with costs and normal profits.
		2. Vertical exploitation; inappropriate use of market power at one or more levels.	2. Equal market power of each vertical level.
		3. "Sticky" prices -- prices at retail unresponsive to changes in supply and demand.	3. Prices adjust rapidly and completely with changes in supply and demand.
	B. Level of employee compensation.	1. Wages at or below Federal minimums.	1. Wage schedules consistent with values of marginal product.
		2. Substandard housing and other perquisites.	2. Wages at or above payments for comparable work in the same locale.
VI. To discourage uneconomic uses and spoilage of natural resources and the environment.	A. Resource conservation practices.	1. Use of production practices relatively wasteful of natural resources.	1. Rapid adoption of innovations which result in decreased use of natural resources.

Continued.

Table 2. -- Performance Objectives, Indicators and Extremes - Continued

Generalized Performance Objective (Shaffer Bill of Rights)	Implied Industry Performance Indicator	Performance Extremes	
		Bad	Good
VII. To encourage socially desirable population settlement patterns.	A. Location of production.	1. All plants located in S.W. Washington, D.C.	1. All plants located in Fallon, Nevada.
		B. Extent of environmental externalities.	1. No recognition of social costs associated with production.
VIII. To encourage a sense of belonging and effectiveness among participants in the system.	A. Morale.	1. Substantial interseasonal instability in employment.	1. Stable employment levels.
		2. Frequent suicides, among industry participants.	2. Frequent orgies among industry participants.

Table 3. -- Possible measures of Industry Performance

Industry Performance Indicator (from Table 2)	Quantifiable Measure	Measureability Index ^{1/}
I-A. Quantity of product.	1. Price minus marginal cost of minimum efficient firm (measure of the degree of monopoly).	9
	2. Percent change in price compared to percent change in quantity, period t to t+n (e.g., if quantity constant or declining and prices rising rapidly, may be evidence of declining competition. Might use prices deflated by appropriate cost index. Would need to adjust for productivity changes.)	2
I-B. Reliability of supplies.	1. Variance in quantity about trend line.	1
	2. Proportion of total variability in supplies associated with price changes compared to that associated with weather conditions or other random occurrences.	5
	3. Incidence of product recalls.	
I-C. Price level and stability.	1. Variance in price about trend line.	1
	2. (Price-marginal cost) ÷ marginal cost or (Price-average cost) ÷ average cost for minimum efficient firm (Measure of inappropriate price level.)	9
	3. Changes in price compared to changes in production costs in long run.	4
		2

Continued.

Table 3. -- Possible measures of Industry Performance

Industry Performance Indicator (from Table 2)	Quantifiable Measure	Measureability Index ^{1/}
	5. Price changes compared to changes in CPI, WPI, or alternative crop prices.	2
I-D. Nutritional adequacy.	1. Trends in product forms with respect to nutrient composition.	6
	2. Changes in nutritional composition from grower to consumer.	4
	3. Level and content of advertising.	9
	4. Correlation between product price per unit and nutritional level.	3
II-A. Market signals.	1. Number and type of identifiable product forms and grades.	2
	2. Grade aggregation--incidence of grade mixing at retail level. Identifiability of grower-level distinctions at retail.	3
	3. Consumer preferences compared to existing grades and standards.	8
	4. Quality, availability of market information and understanding.	8
II-B. Relative price relationships.	1. Cross-price elasticities among product forms and grades.	8
	2. Retail prices of product forms compared to costs.	6
III-A. Productivity.	1. Output per man-hour over time.	2
	2. Level of investment over time relative to changes in demand.	3
	3. Output relative to industry capacity.	9
	4. Rate of adoption for productivity-increasing innovations.	3

Continued.

Table 3. -- Possible measures of Industry Performance

Industry Performance Indicator (from Table 2)	Quantifiable Measure	Measureability Index ^{1/}
	5. Plant size distribution relative to minimum efficient size.	5
	6. Number of new product forms introduced.	2
	7. R&D expenditures relative to sales.	3-4
IV-A. Level and type of employment.	1. Employment over time.	1-2
	2. Distribution of jobs with respect to required skills and type of work.	6
	3. Extent of labor organization.	1-2
IV-B. Level of employee compensation.	1. Wage rates and benefits relative to comparable jobs in locale.	7
	2. Changes in wage rates relative to CPI.	2-3
	3. Changes in wage rates relative to changes in output per man-hour.	2
V-A. Level of price spreads.	1. Grower returns and marketing margins relative to production and marketing costs.	6-7
	2. Flexibility of price spreads with changing costs of goods sold.	5
	a - increases	
	b - decreases	
VI-A. Resource conservation practices.	1. Extent of adoption of resource-conserving innovations relative to comparable activities in the locale.	8
	2. Waste	
VI-B. Extent of environmental externalities.	1. Degradation of environmental quality relative to comparable activities.	6

Continued.

Table 3. -- Possible measures of Industry Performance

Industry Performance Indicator (from Table 2)	Quantifiable Measure	Measureability Index ^{1/}
VII-A. Location of production.	2. Environmental progressiveness-- rate of adoption of pollution- reducing innovations.	4
VIII-A. Morale.	1. Assembly and distribution costs relative to spatial minimum. 1. Interseasonal variation in employment.	9 1-2

^{1/} Measureability based on a scale of 0 to 10: 0 = easily measured by direct observation of secondary data; 10 = impossible to measure.

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