Scarcity Effects on Value: A Quantitative Review of the Commodity Theory Literature

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Commodity theory (Brock, 1968) deals with the psychological effects of scarcity. According to the theory, scarcity enhances the value (or desirability) of anything that can be possessed, is useful to its possessor, and is transferable from one person to another. This article introduces commodity theory to the marketing literature, reports a meta-analysis of studies designed to test the theory, and discusses the marketing implications of the theory along with suggestions for future marketing research.

Scarcity is a pervasive aspect of human life and is a fundamental precondition of economic behavior. Although the academic marketing and consumer- behavior literatures contain relatively little about the psychological effects of scarcity, marketing practitioners have long assumed that scarcity enhances the perceived value of products and opportunities (Cialdini, 1985). Thus, advertisers frequently use phrases like "limited release," "only while supplies last," "limited time only," and "limit of one per customer." In addition, salespeople often indicate that "supplies are dwindling fast," or even that "this is the last one." One psychological theory supporting this assumption about scarcity's enhancement of value is commodity theory (Brock, 1968). This article introduces commodity theory to the marketing literature, reviews existing research that tests the theory, and discusses the marketing implications of the theory along with suggestions for future marketing research.

Commodity Theory

Commodity theory (Brock, 1968) deals with the psychological effects of scarcity. Its principle claim is that "any commodity will be valued to the extent that it is unavailable" (p. 246). However, a complete understanding of this principle requires an extended definition of three of its concepts—i.e., commodity, value, and unavailability.

"Commodities" are any things—messages, experiences, or objects— that meet three criteria. First, commodities must be useful. Something is a commodity to a person only if it has some utility to him or her. Second, commodities must be transferable from one person to another. Things that cannot be given to, or taken from, others are not commodities as defined by the theory. Finally, commodities must have the potential to be possessed. Things which are beyond the reach of a person are not

commodities for him or her. This definition of commodities gives commodity theory a broad domain that encompasses many things of interest to marketers. All marketable goods and services are commodities by this definition. Even promotional activities like sales events and price reductions can be considered commodities because they are conveyed from sellers to consumers and because they have some utility to the consumers.

"Value" refers to a commodity's "potency for affecting attitudes and behavior" (Brock, 1968, p. 246). Since commodities have a positive utility, any enhancement of a commodity's value (or potency) will increase its perceived utility and will make the commodity more desirable and sought after. Thus, the term "value" can be equated with "utility" or "desirability." Marketers are interested in making their products and services more desirable and sought after, so commodity theory's predictions about scarcity effects on value have some relevance to their goals.

"Unavailability" refers to scarcity and other limits on availability. Brock (1968) presented several hypotheses that provide operational definitions of "unavailability" as (a) limits on the supply, or the number of suppliers, of a commodity, (b) costs of acquiring, of keeping, or of providing a commodity, (c) restrictions limiting possession of a commodity, and/or (d) delays in providing a commodity. These potential operationalizations of unavailability have numerous counterparts in marketing actions. Producing limited editions of products, having exclusive distribution outlets for products, prestige pricing of products, and restricting maximum order size for products are all common practices that make products unavailable. Thus, commodity theory's predictions about the psychological effects of unavailability are extremely relevant to marketing practice.

Commodity theory did not originally specify the mechanisms underlying scarcity effects on value. However, Brock (1968) did suggest one possibility—that people may desire scarce commodities more than comparable available commodities because the possession of scarce commodities conveys feelings of personal distinctiveness or uniqueness. This possibility would justify commodity theory's boundary conditions because scarce commodities are likely to produce positive anticipated feelings of distinctiveness only if they are desirable and have the potential of being possessed.

Howard Fromkin and Richard Snyder have taken and expanded this speculation into a separate theory about the need for uniqueness. According to need-for-uniqueness theory (Fromkin, 1973; Snyder & Fromkin, 1980), people need to feel moderately unique. Consistent with this theory, research has shown that people react negatively to information that they are highly similar to many others (Fromkin, 1972). Since material possessions are often an extension of the self (James, 1890; Belk, 1989), one potential source of self-uniqueness is the possession of scarce commodities. Thus, need-for-uniqueness

theory has come to be seen as an explanation for the scarcity effects predicted by commodity theory (cf., Atlas & Snyder, 1978; Fromkin, 1970; Snyder & Fromkin, 1980).

Literature Review

Commodity theory has generated a small but substantial body of empirical research in the 21 years since its origin. This literature is reviewed below using meta-analytic procedures. The review permitted an assessment of commodity theory's claim that scarcity enhances value and an assessment of the role of uniqueness striving in producing these scarcity effects.

Method

Selection of Studies

An attempt was made to identify all the studies explicitly designed to test commodity theory. These tests of the theory were found in several ways. First, all of the published studies citing Brock (1968) were located by a hand search through the *Social Science Citation Index* from 1968 to 1988. This manual search was supplemented by a computer search of the same index from the beginning of the computer records in 1972 to 1989. Second, published and unpublished studies whose titles or abstracts mentioned commodity theory were located through computer searches of *Psychological Abstracts* (1968-1989), *Dissertation Abstracts* (1968-1989), and *ERIC* (1968-1989). Finally, additional published and unpublished articles were identified through personal knowledge of the topic area, through references of the already identified studies, and through communications with some of the major researchers on this topic.

The literature search identified 46 studies that provided tests of commodity theory and that were reported in articles whose introductions cited the theory. However, five of these studies (in Fromkin, 1967; Piehl, 1977; Verhallen, 1982, 1984) had to be excluded from the meta-analysis because various problems prohibited reliable effect sizes from being obtained for them. Thus, 41 studies designed to test commodity theory were analyzed in this review. A bibliography of the 32 articles and papers containing these studies is the Appendix.

Effect Sizes and z Scores

Effect sizes and *z* scores were calculated for 51 scarcity main effects (or simple main effects) and for 11 scarcity by need-for-uniqueness interactions (or equivalent effects) in this meta-analysis. Separate effect sizes and 2 scores were calculated for each different scarcity manipulation even when a single study contained more than one such manipulation. However, only one dependent measure from each

study was used to calculate these effect sizes and *z* scores. The dependent measures selected for use in this meta-analysis were identified by the original authors as the principle measures of interest or were the first dependent measures completed by the subjects. The values for the effect sizes and *z* scores were calculated or estimated using procedures described by Rosenthal (1984). Nonsignificant tests for which effect sizes could not be calculated were assigned a value of 0. A more detailed description of, and justification for, these decisions and procedures can be found in Lynn (1987).

Study Attributes

Several attributes of the studies in this meta-analysis were coded as potential between study moderators of scarcity effects. Answers to the following questions were recorded.

1. Was the commodity tangible or intangible?
2. Did the commodity have economic value—i. e., is it typically bought and sold in economic markets? (Y/N)
3. Were subjects told they would receive one of several commodities based on their ratings, rankings, or selection of the commodities? (Y/N)
4. Were subjects promised or given the commodity in the experiment prior to collection of the dependent measures? (Y/N)
5. Did the scarcity manipulation limit the market availability of those commodities with economic value? (Y/N)
6. Was the relevant experimental manipulation a manipulation of scarcity, restriction, cost/effort, delay, or other?

Each study's attributes were independently coded by two raters whose decisions agreed over 90% of the time. All disagreements were resolved in subsequent discussion. A summary of the coding decisions, and of the effect sizes and z scores, is presented in Table 1.

Results

The data in this meta-analysis were analyzed using procedures described by Rosenthal (1984). The effect size estimates *(r)* and the *z* scores were combined with each observation weighted equally.

Significance of Scarcity's Effects

The principle claim of commodity theory (Brock, 1968) is that scarcity enhances the value of anything that can be possessed, is useful to its possessor, and is transferable from one person to

another. The 41 studies included in this meta-analysis contained 51 tests of this principle. Combining these test using the Stouffer method (Mosteller & Bush, 1954) produced a combined z of 8.39. This indicates that support for the theory is highly reliable *{p* < 0.0001). Moreover, it would take an additional 1277 studies averaging null results to bring this combined significance level below the 0.05 level.

Significant Reversals of Scarcity's Effects

Despite the overall reliability of scarcity's enhancement of value, not all the studies in this meta-analysis produced the predicted effects. In fact, five studies produced significant reversals of the predicted scarcity effects (z < -1.65). An examination of these studies suggests that scarcity's enhancement of value may sometimes be overwhelmed by concerns about being, or appearing, selfish. Three of the significant reversals came from studies that asked subjects to select from among, or to rank-order their preferences for, commodities that varied in availability (i.e., Dutcher, 1975; Hudson, 1979; Shippee, Mowen, and Gregory, 1981). Subjects thought that their selections or rank-orderings would be used to distribute the commodities and that there were not enough scarce commodities for everyone. Thus, these subjects may have deliberately avoided expressing a preference for the scarce commodities in order to avoid being, or appearing, selfish. Consistent with this explanation, the reversal of Shippee et al. (1981) was carried by conditions designed to heighten subjects' concerns with the self-image implications of their choices. However, some studies that distributed commodities on the basis of subjects' expressed desire for those commodities found the predicted scarcity effect. This suggests that the hypothesized concern about selfishness is not always powerful enough to overcome scarcity's enhancement of value. Clearly, more research is needed to understand the dynamics of the competition between people's desire for scarce commodities and their desire to avoid selfishness.

TABLE 1
A Summary of the Studies Testing Commodity Theory

Study First author/year	Commodity: Description	Commodity: Tangible (Y/N)	Commodity: Economic value (Y/N)	Commodity: Possessed in experiment (Y/N/D[a])	Commodification: Type	Commodification: Market scarce (Y/N)	Effect: df	Effect: *r*	Effect: *z*
Archer, 1986	Self-disclosure	N	N	Y	Other		72	0.00	−0.03
Atlas, 1978	Picture and chair	Y	Y	N	Scarcity	Y	73	0.31	2.65
Austin, 1981	See films	N	Y	N	Restriction	Y	379	0.00	0.00
Brock, 1967	Read message	N	N	Y	Scarcity		64	0.00	0.00
					Scarcity		64	0.18	1.44
Ditto, 1989									
Study 1	Health condition	N	N	N	Scarcity		70	0.17	1.46
Study 2	Health condition	N	N	Y	Scarcity		52	0.24	1.73
Dutcher, 1975	See videos	N	Y	D	Scarcity	N	95	−0.54	−5.24
Fromkin, 1970	Experience	N	N	D	Scarcity		50	0.24	1.70
Fromkin, 1971	Hear message	N	N	Y	Scarcity		89	0.19	1.79
					Scarcity		89	0.14	1.31
Fromkin, 1971	Nylon hose	Y	Y	Manipulated	Scarcity	Y	34	0.30	1.75
Fromkin, 1974	Leather boot	Y	Y	N	Scarcity	Y	68	0.35	2.92
Herman, 1977	See T.V. show	N	N	D	Restriction		182	0.24	3.18
Hudson, 1979	See films	N	Y	D	Other	N	116	−0.22	−2.36
Jones, 1980	Magazine pictures	Y	Y	N	Restriction	Y	72	−0.20	−1.68
Kardes, 1986	Participate in experiment	N	N	D	Restriction		49	0.12	0.81
Knishinsky, 1982	Beef	Y	Y	D	Scarcity	Y	84	0.07	0.64
	Info	N	Y	Y	Other	Y	84	0.24	2.20
Lynn, 1987									
Study 1	Art prints	Y	Y	N	Scarcity	Y	316	0.10	1.71
Study 3	Pen/manual	Y	Y	Manipulated	Scarcity	Y	281	0.04	0.73
Study 4	Pen/manual	Y	Y	Manipulated	Scarcity	Y	48	0.06	0.45
Lynn, 1989									
Study 1	Art prints	Y	Y	N	Scarcity	Y	384	0.07	1.44
Study 2	Wine	Y	Y	N	Scarcity	Y	163	0.16	2.09
Murray, 1980									
Stories 1 and 2	Cookie/ice cream	Y	Y	N	Scarcity	Y	62	−0.27	−2.18
Story 4	Model glider	Y	Y	N	Scarcity	Y	62	0.25	2.05
Okamoto, 1983	Experience	N	N	D	Scarcity		30	0.34	1.88
	Pen				Scarcity		28	0.00	0.00
Petty, 1976	Hear message	N	N	Y	Effort		108	0.00	0.00
Petty, 1980									
Study 1	See video	N	N	Y	Scarcity		48	0.27	1.87
Study 2	Read message	N	N	Y	Scarcity		168	0.26	3.32
Petty, 1981	Self-disclosure	N	N	Y	Scarcity		108	0.40	4.13
Pincus, 1976	Book	Y	Y	N	Restriction	Y	184	0.18	2.46
Powell, 1974	Hear message	N	N	N	Scarcity		141	0.06	0.72
Shippee, 1981									
Study 1	Candy	Y	Y	D	Scarcity		31	0.03	0.18
Study 2	Candy	Y	Y	D	Scarcity	N	56	−0.29	−2.14
Sloan, 1975	Hear message	N	N	Y	Effort		225	0.00	0.00
Szybillo, 1973	Clothes	Y	Y	N	Scarcity	Y	212	0.42	6.13
					Cost	Y	106	0.09	0.93
Szybillo, 1975	Clothes	Y	Y	N	Scarcity	Y	174	0.43	5.64
Worchel, 1975									
Study 1	Cookies	Y	Y	Y	Scarcity	N	122	0.32	3.48
					Scarcity	N	122	0.08	0.90
Study 2	Cookies	Y	Y	Y	Scarcity	N	58	0.18	1.41
Weiss, 1970	Info	N	N	Y	Restriction		52	0.00	0.00
Yoder, 1967									
Study 1	See research	N	N	Y	Scarcity		88	0.10	0.93
					Scarcity		88	0.10	0.93
					Restriction		88	0.24	2.26
Study 2	See research	N	N	Y	Scarcity		66	−0.03	−0.25
					Scarcity		66	0.06	0.51
					Restriction		66	0.24	1.98
Zellinger, 1975	Book	Y	Y	N	Restriction	Y	60	0.27	2.11

[a] In these studies, subjects' possession of the commodity depended on their evaluations of it.

Size of Scarcity's Effects

Although highly reliable, the scarcity effects in this meta-analysis were fairly small with a mean effect size (r) of 0.12. Even omitting the significant reversals (as outliers) produced a mean effect size (r) of only 0.17. Of course, not all the scarcity effects were this small—they ranged from - 0.54 to 0.43 and were significantly heterogeneous [x^2 (48) = 190.22, $p < 0.005$].

Between-Study Moderators of Scarcity's Effects

The significant heterogeneity of the scarcity effect sizes means that differences between the studies were responsible for at least some of the differences in their effect sizes. Meta-analysts usually try to identify meaningful between-study moderators of effect size. However, I have decided not to emphasize tests for such between-study moderators of scarcity effects. These analyses are correlational and difficult to interpret even under the best of conditions. In this case, interpretation was particularly difficult because the study characteristics I coded were highly correlated and the number of studies was too small to allow their effects to be teased apart. In addition, the study characteristics I examined produced different results when I made different, but equally justifiable, decisions about what studies to include in the analyses.

The interpretive difficulties outlined above severely limited the utility of examining between-study moderators of scarcity's effects. However, the interested reader can find two analyses of between-study moderators in Table 2. The most important thing to notice from this table is that scarcity's enhancement of value is very robust even if small. The predicted scarcity effects were reliable for scarcity and restriction manipulations, for tangible and nontangible commodities, for possessed and unpossessed commodities, and for commodities that did and did not have economic value.

Scarcity by Need-For-Uniqueness Interactions

Brock (1968) and Fromkin (1970) suggested that people may value scarce commodities because of the commodities' contributions to their sense of uniqueness. Several studies have tested this explanation by examining the relationship between need-for-uniqueness and preference for scarce over available commodities (see Table 3). These tests yielded a combined *z* of 3.59, which is significant beyond the 0.001 level. Consistent with this explanation, the preference for scarce commodities was greater for subjects with a high need-for-uniqueness. However, these effect sizes were significantly heterogeneous [x^2 (10) = 24.05, $p < 0.01$] and the predicted effect was reliable in only 4 of the 11 tests. These results suggest that uniqueness striving can produce scarcity effects, but that it is not a robust

explanation for scarcity's enhancement of value. Unfortunately, a post-hoc examination of the relevant studies revealed no differences that might explain this heterogeneity of effects.

TABLE 2
Summary of Analyses of Between-Study Moderators for Selected Studies and for all Studies

	Selected Studies[a]			All studies		
Potential moderator	N	$\bar{r}$[b]	Combined z	*n*	$\bar{r}$[b]	Combined z
Type of commodification						
Scarcity	33	0.18[c]	10.03	36	0.13	8.01
Restriction	8	0.16[c]	4.53	9	0.12	3.71
Effort	3	0.03[d]	0.05	3	0.03	0.05
Other	2	0.12[c,d]	1.53	3	0.01	−0.11
Type of Commodity						
Tangible	20	0.19	8.87	23	0.13	7.02
Nontangible	26	0.15	6.64	28	0.10	4.96
Commodity possessed?						
Yes	22	0.15	6.38	22	0.15[c]	6.38
No	14	0.21	8.64	16	0.15[c]	7.11
Depends on S's responses	7	0.15	3.17	10	−0.01[d]	0.04
Economic commodity?						
No	24	0.15	6.46	24	0.15[c]	6.46
Yes						
Nonmarket scarce	4	0.16	2.99	7	−0.07[d]	−1.42
Market scarce	18	0.19	8.46	20	0.15[c]	7.16

[a] This set of studies excludes the five large reversals of the predicted scarcity effects on the grounds that they were outliers. [b] Effect sizes (within each set of studies and set of conditions) with different superscripts are different at the two-tailed 0 05 level.

TABLE 3
Summary of Studies Testing a Scarcity by Need-for-Uniqueness Interaction or an Equivalent Effect

		Interaction		
Study	*n*(Uniq)	df	*r*	*z*
Atlas and Snyder, 1978	Measured	73	0.12	1.03
Dutcher, 1975	Measured	93	0.00	0.00
Fromkin, 1970	Manipulated	36	0.47	2.82
Fromkin et al., 1974	Measured	68	0.22	1.80
Hudson, 1979	Measured	116	0.08	0.85
Lynn				
Study 3	Measured	281	0.02	0.35
Study 4	Measured	48	0.31	2.18
Lynn, 1989	Measured	125	−0.01	−0.14
Okamoto, 1983				
Experience	Manipulated	30	−0.15	−0.83
Pen	Maniuplated	28	0.00	0.00
Powell, 1974	Manipulated	105	0.38	3.86

Marketing and Research Implications

Scarcity Effects

The results of this meta-analysis provide strong support for commodity theory's proposition that scarcity enhances the value of anything that can be possessed, is useful to its possessor, and is

transferable from one person to another. This support for commodity theory suggests that marketers can increase the perceived value of products, services, and promotions by manipulating the perceived scarcity of those products, services, and promotions. Common marketing practices like advertising a product's scarcity, producing limited editions of products, distributing products through exclusive outlets, prestige pricing of products and services, and restricting maximum order sizes for products and promotional offerings should all increase perceived value. However, very little of the research conducted to date has employed these specific scarcity manipulations in real-world marketing contexts. Thus, research with greater mundane realism is needed to assess the effectiveness of specific marketing manipulations of scarcity.

The average scarcity effect size in the meta-analysis was an r of 0.12, which converts to an r^ of only 1%. Although this effect size seems quite small, Rosenthal and Rubin (1979) have argued that the variance accounted for does not provide a good feel for the importance of an effect. They recommended the use of a binomial effect-size display (BESD) to convey this information. The BESD reflects the change in the "success rate" associated with a given factor when the average "success rate" is 50%. For the average scarcity effect reported above, the "success rate" goes from 44% in control conditions to 56% in the treatment conditions. If we define success in terms of making sales, then this effect size does have practical importance.

While an effect size *r* of 0.12 can have practical utility, marketers will want to increase this effect size when possible. Other psychological theories suggest ways of doing this. Reactance theory (Brehm, 1966; Clee & Wicklund, 1980), dissonance theory (Festinger, 1957), the energization model of motivation (Brehm, Wright, Soloman, Silka, & Greenberg, 1983), and personal-equity theory (Seta & Seta, 1982) all describe psychological processes that should produce scarcity effects on value. However, these theories impose more conditions on the scarcity effects than does commodity theory. For example, reactance theory predicts scarcity effects only when people feel that possession of a commodity is an important right or freedom and perceive scarcity as a threat to that freedom. Thus, commodity theory predicts a more general scarcity effect than do these other theories. This suggests that the more restrictive scarcity effects may (under the more restrictive conditions) add to those predicted by commodity theory. Future research should investigate this possibility.

Need for Uniqueness

The meta-analysis found that scarcity's enhancement of value was reliably stronger the greater people's need for uniqueness. This suggests that scarcity tactics will be more effective when targeted at

consumers who possess greater than average needs for uniqueness. Such targeting would be facilitated by an understanding of the demographic, life-style, and other characteristics of high need-for-uniqueness individuals. Thus, future research should seek to identify these characteristics.

Although statistically reliable, the scarcity by need-for-uniqueness interactions and equivalent effects were of significantly heterogeneous sizes and contained several failures to replicate. This suggests that uniqueness striving does not always produce scarcity effects and that future research should seek to identify the conditions under which it does and does not do so. One variable that may prove important is the commodity's function. Different products serve different functions in people's lives. Some products, like coffee or air conditioners, are primarily valued for their utility, whereas others, like flags or clothing, are valued for their symbolic and self-defining properties (Holman, 1981; Levy, 1959; Shavitt, 1986). The need for a sense of personal uniqueness might be expected to produce stronger scarcity effects for products that typically serve the latter social- identity functions. This would be an important limitation on the utility of scarcity tactics, so future research should test this hypothesis.

Of course, scarcity may also change the functions that products serve. For example, people may usually drink coffee for its taste and caffeine, but might purchase and use a particularly rare blend of coffee in order to establish themselves as people of distinctive and distinguished tastes. Shavitt (1986) has developed techniques for ascertaining the functions served by a particular product. These techniques should be exploited to test whether scarcity can cause changes in the functions that commodities serve.

Some of the studies failing to find a scarcity by need-for-uniqueness interaction nevertheless found reliable scarcity main effects (Atlas & Snyder, 1978; Okamoto, 1983). This suggests that some other processes also produce scarcity effects. One possibility is that scarcity's enhancement of value is an extension of economic and social exchange principles (Lynn, 1987). Scarcity and value jointly determine price in both social and economic markets, so people may have learned to associate the attributes of scarcity, price, and value with one another. Thus, a kind of implicit economic theory may be partially responsible for scarcity's enhancement of value.

Scarcity effects on price (Fromkin, Olson, Dipboye, & Barnaby, 1971) and price effects on perceived value (Rao & Monroe, 1989) provide some suggestive support for the existence of this implicit economic theory. Recently, Lynn (1989) provided evidence that this implicit economic theory may indeed explain some scarcity effects on value. In one study, he found scarcity effects only when subjects had been primed to think about the price implications of the scarcity, and in another he found scarcity

effects only when subjects were not told how much the commodity cost. These results suggest that assumed expensiveness mediated the studies' scarcity effects, but more research is needed to test this and other potential explanations for scarcity's enhancement of psychological value.

Appendix

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