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# When demand accelerates demand: Trailing the bandwagon ☆

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**Abstract**

Consumers generally prefer scarce products, which has been related to their exclusiveness. Currently scarce products, however, are not necessarily exclusive, but could be scarce because many other consumers previously bought them. We propose that consumers also prefer scarce products in this situation, which an appeal to uniqueness cannot explain. Three experiments support our predictions and reveal that scarcity effects even occur when consumers only see traces of others' behavior through emptied shelf space. Furthermore, this bandwagon effect disappears when uniqueness is threatened due to others in close spatial distance.


*Keywords:* Product scarcity; Commodity theory; Bandwagon effect; Snob effect

Imagine that you want to buy a bottle of wine for dinner. You go to the liquor store and see that one of the wines, a Bordeaux with a classic aroma and pleasant tannins, is almost but not completely sold out. It stands on a nearly empty shelf, because consumers before you have apparently bought this particular wine today. What is the likelihood that you will buy one of the few remaining bottles?

Prior demand for the Bordeaux wine has created relative scarcity for this wine compared to alternative wines. Product scarcity is the topic of commodity theory, according to which any commodity, that is, anything that is useful and can be conveyed to another person, will be "valued to the extent that it is unavailable" (Brock, 1968, p. 246). A common explanation is that consumers value a scarce product because it demonstrates their uniqueness (Amaldoss & Jain, 2005; Fromkin, 1970; Snyder, 1992). Uniqueness theory, a prevailing perspective in the broader class of commodity theories, thus posits that the limited availability of the scarce product implies exclusiveness, which consumers use to express uniqueness. Although uniqueness theory provides the leading explanation for scarcity effects, an early meta-analysis concluded that "uniqueness striving does not always produce scarcity effects and … future research should seek to identify the conditions under which it does and does not do so" (Lynn, 1991, p. 53). The wine example provides an opportunity to elaborate on this, because scarcity does not imply uniqueness but rather communality here.

This is of interest because under these conditions uniqueness theory predicts that consumers have a lower preference for the scarce Bordeaux wine. After all, the theory argues that consumers "value a product less when more consumers own it" (Amaldoss & Jain, 2005, p. 30). An alternative perspective, which would predict a preference for the scarce product even when it is not unique, is suggested by economic theories of bandwagon effects and herd behavior (Banerjee, 1992; Bikhchandani, Hirshleifer, & Welch, 1998; Corneo & Jeanne, 1997) and psychological theories of conformity and social influence (Asch, 1955; Baron, Vandello, & Brunsman, 1996; Deutsch & Gerard, 1955). Bandwagon effects occur when consumers follow the behavior of others. Consumers may do this because they want to 'fit in' or because they believe that the choice behavior of others reveals which product is superior, and

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they do not want to miss out on this. Such behaviors may even occur when consumers do not directly observe the behavior of others but only the traces they leave behind (i.e., emptied shelf space).

To date, investigations of product scarcity have mainly examined situations where a product is scarce in an absolute sense, that is, where its overall availability is low (Fromkin, 1970; Lynn, 1989; Stock & Balachander, 2005). This is surprising because in worlds of abundance, relative scarcity due to understocking and product popularity is very common (Van Herpen, Pieters, & Zeelenberg, 2005). Although it is clearly of importance to understand how scarcity due to large *prior demand* influences product choice, this effect is not well understood. Consumer responses to complete stockouts have been examined before (Fitzsimons, 2000), but little is known about their responses to incomplete shelf stockings, that is, to partly filled shelves, despite the fact consumers are confronted with incompletely stocked shelves most of the time. Moreover, whereas complete stockouts prevent consumers from choosing a certain option, incompletely filled shelves leave consumers with all the options, including the scarce product. It is unclear whether such relative scarcity decreases product choice (as uniqueness theory would predict) or increases product choice (as the bandwagon hypothesis would predict). The goals of the current study are (1) to demonstrate that scarcity due to excess demand triggers quality inferences and bandwagon effects, (2) to illustrate that this occurs even in the absence of other people, based solely on traces of their behavior, as reflected in partially stocked store shelves, and (3) to show that concerns about communicating a distinctive identity from spatially close others reverses the bandwagon effect.

Given its prominence as an explanation for scarcity effects, the next section first introduces uniqueness theory. Next, we discuss the bandwagon effect and the opposite prediction it makes for scarcity due to excess demand. Then, three experiments examine which effect occurs, and whether scarcity increases choice even in the absence of any uniqueness in the relative scarcity.

## Scarcity

Commodity theory is the organizing framework for a stream of research regarding the effects of supply limitations, restrictions, acquisition costs, and delays (Brock, 1968; Lynn, 1991). According to commodity theory, unavailability or scarcity of a commodity increases its value. It has inspired a substantial body of research, supporting the value-increasing function of scarcity for such diverse commodities as psychedelic experiences (Fromkin, 1970), fast food (Brannon & Brock, 2001), pornography (Zellinger, Fromkin, Speller, & Kohn, 1975), batteries, audiocassettes, and toothbrushes (Inman, Peter, & Raghubir, 1997). Originally, the theory did not specify why scarcity enhances value, but uniqueness theory was developed to specifically account for this (Fromkin, 1970; Fromkin & Snyder, 1980).

### *Uniqueness theory*

According to uniqueness theory, consumers have a need to be moderately dissimilar from others and the possession of unique products differentiates the self from others. It thus argues that consumers want to acquire self-identifying products that define the person as different from the multitude of others (Fromkin, 1970; Snyder, 1992). The exclusiveness of scarce products stimulates a snob effect, that is, an increase in demand because others are not consuming the same commodity (Leibenstein, 1950). Scarce products can become status symbols that consumers use to demonstrate their uniqueness and superiority (Amaldoss & Jain, 2005; Fromkin, 1970; Veblen, 1899/1998).

Uniqueness theory assumes that scarce products are necessarily more exclusive than abundant ones. This is of course true for products that are scarce in an absolute sense, when the number of products in a particular market situation is limited. However, products that are relatively scarce at one particular location or point in time need not be scarce at other locations or points in time. Especially, products that appeal to many consumers, and are not exclusive, can temporarily become scarce due to high or even excess demand. Because most tests of commodity theory have examined *supply restrictions* as the cause of scarcity (e.g., Inman et al., 1997, Lynn, 1989, Zellinger et al., 1975), not much is known about relative scarcity due to *excess demand*, and this distinction is important. Initial research on demand-caused scarcity suggests that consumers may prefer such scarce products to abundantly available products (Verhallen & Robben, 1994, Worchel, Lee, & Adewole, 1975), although support is scarce and inconsistent (Shippee, Mowen, & Gregory, 1981). Uniqueness theory cannot account for such a preference, and the next section therefore introduces an alternative mechanism.

### *Bandwagon effects*

Bandwagon effects appear when consumers buy products that other consumers have chosen before them, in which case demand accelerates because others consume the same product (Corneo & Jeanne, 1997; Leibenstein, 1950). When consumers perceive high demand for a chocolate chip cookie, for instance, they want it too (Worchel et al., 1975), and when a restaurant is popular, they want to eat there as well (Becker, 1991). We speculate that when consumers do not observe the behavior of others directly, traces of other consumers' behavior might already be of influence and prompt the bandwagon effect. Consumers then use a context-specific choice strategy ('choose the option that is most popular') to make their decision, without necessarily trading off the attributes of the products (Amir & Levav, 2008). This does not imply that demand automatically accelerates demand in all situations. Bandwagon effects may not occur when consumers worry about network externalities, such as congestion costs and overburdened systems, or about a loss of exclusivity, as we will examine later (Hellofs & Jacobson, 1999).

Bandwagon effects can occur for different reasons. Consumers may prefer popular products because the purchase of popular products may result in inclusion with the majority ("fitting in"). Consumers have a strong desire to belong and to form meaningful interpersonal relationships (Baumeister & Leary, 1995) and using similar products as others can establish that they belong to a social group (Berger & Heath, 2007; Escalas & Bettman, 2005). Consumers thus tend to conform their views and opinions, but also the products they buy, to others (Asch, 1955; Bearden & Etzel, 1982), and the need to distinguish oneself from others, which uniqueness theory advocates, is countervailed by a need to belong. Consumers must balance these two opposing needs to achieve optimal distinctiveness (Brewer, 1991; Hornsey & Jetten, 2004). Bandwagon effects due to product scarcity may thus increase when consumers want to 'fit in', that is, when consumers have a conformity goal (van Herpen, Pieters, & Zeelenberg, submitted for publication).

Consumers may also prefer popular products because popularity signals quality (Caminal & Vives, 1996). They then use information about the product's popularity to make spontaneous inferences about the quality of the product (Kardes, Posavac, & Cronley, 2004). In *the wisdom of crowds*, Surowiecki (2004) asserts that "With most things, the average is mediocrity. With decision making, it's often excellence. You could say it's as if we've been programmed to be collectively smart" (p. 11). When many diverse consumers make independent decisions, averaging across these decisions will mostly point towards superior options. For decisions as diverse as judging the weight of an ox at a country fair, answering questions at a TV game show, buying stocks, and betting on sports games, the average decision reached by a group is often remarkably accurate (Surowiecki, 2004). This accuracy not only holds for decisions with an objectively correct answer. Consumers, collectively, may also be accurate in picking useful options from large sets when preferences vary. Google, for instance, leverages this popularity principle in its web search engine. The behavior of others thus provides clues about the quality of products (Burnkrant & Cousineau, 1975; Huang & Chen, 2006), and in contrast with uniqueness theory, it leads to the prediction that scarcity due to excess demand increases product preference.

### *Level of prior demand*

It is not obvious whether consumers will have a stronger response and whether they will infer that a product is of higher quality to the extent that more others have previously bought it (e.g., when the drop in inventory level is larger), or that such scarcity effects are of an all-or-none character. When consumers start following each other, and so-called "information cascades" start to form, the number of other buyers, theoretically, contains little information about product quality (Banerjee, 1992; Bikhchandani et al., 1998). Consumers no longer arrive at their decisions independently and later choices provide no additional information, because these choices may have been made solely because consumers have started to follow others before them. When consumers realize this, they may not closely connect the level of prior demand to the magnitude of quality differences between products (Hanson & Putler, 1996). However, consumers can have a (perhaps erroneous) belief that others are better informed than they are. They generally underestimate the influence of situational factors when they examine the choices of others (Gilbert & Malone, 1995), and may thus believe that greater demand is evidence that more consumers independently value the product. They infer that the product must be of better quality the more others have previously bought it, and we expect that this effect may predominate, which will be tested.

### *Reversing the bandwagon effect*

In addition to the bandwagon effects that we examine here (induced by relative scarcity), there may also be situations in which the opposite occurs and consumers avoid products that are scarce due to excess demand. Because product purchase and consumption are important ways in which consumers create their personal identity, consumers often do not want to own the exact same products as others in domains that are important for their identity. They may want to be *similar* to others, but not *identical* to them (Brewer, 1991; Brickman & Bulman, 1977). Owning the exact same product as relevant others can thus threaten a consumer's identity, because it undermines the distinctiveness of the self from others, and consumers may consequently reject products that are already possessed by many others.

Consumers often compare themselves and the products they own with others and such comparisons can be more threatening when these others are more relevant or important (Argo, White, & Dahl, 2006; Pelham & Wachsmuth, 1995). Consumers thus appear to respond more strongly to product scarcity when other consumers are more relevant (i.e., from their in-group) than when these other consumers are less relevant (i.e., from an out-group) (van Herpen et al., submitted for publication). This may reflect a more general tendency, in which consumers feel that their identity is more threatened by the product ownership of psychologically close others, where psychological distance comprises social distance (who; in-group vs. out-group), temporal distance (when; near vs. distant future), and spatial distance (where; near vs. distant place) (Fujita, Henderson, Eng, Trope, & Liberman, 2006; Kim, Zhang, & Li, 2008). Generalizing psychological to spatial distance, consumers should thus feel that their identity is more threatened when spatially close others own the same product than when more distant others, who they are unlikely to meet, own this product. When consumers believe that close others had the opportunity to buy a product that is now scarce due to excess demand, they may avoid choosing this scarce product and the bandwagon effect reverses. This decrease in preference for the scarce product when the consumers' identity is threatened runs counter to uniqueness theory.

Importantly, the threat that close others may own an identical product is pertinent only when scarcity stems from excess demand. In the case of firm-caused scarcity, where companies

limit the production of a product, for instance to signal quality (Stock & Balachander, 2005), the limited supply of the scarce product restricts the potential threat to the consumer's identity. Spatial distance should then not affect consumers' choice of the scarce product, thereby revealing when scarcity accelerates and decelerates demand.

## Outline and predictions

Although the notion of bandwagon effects has been widely discussed with much anecdotal, observational, and survey support, empirical evidence under controlled conditions for their existence and for the conditions upon which they occur is remarkably scarce. The present study aims to demonstrate such bandwagon effects and to show that consumers prefer scarce products even when these are not exclusive. We predict that demand-caused scarcity stimulates the choice of a scarce product, as well as inferences of product quality. In addition, we expect that scarcity effects are larger when a larger number of other consumers have already bought the scarce product. Finally, we predict that preference for the scarce product decreases or disappears when spatially close rather than distant others may have already bought an identical product, and that such an effect does not occur when scarcity is due to a restricted product supply.

Three experiments test these predictions. Experiment 1 provides an initial test in a realistic shopping situation of the idea that excess prior demand increases product choice. It uses a simulated retail setting with partially emptied shelves, to examine whether mere traces of collective behavior without other consumers actually being present influence consumers' behavior. Experiment 2 builds on this by examining the quality inferences that consumers make and the effect of the *level* of inventory depletion. Experiment 3 tests the prediction that spatial distance moderates the effect of demand-caused scarcity. Support for our predictions would show how even without the presence of other consumers, the traces of their past behaviors systematically affect preference formation and choice. It would reveal when demand accelerates demand, and when it does not.

## Experiment 1: Depleted inventory and product choice

### *Method*

#### *Participants and design*

Sixty-eight members of a representative food panel (24 male and 44 female, age from 20 through 60 years) were randomly assigned to one of two conditions, with either a small (1/3 emptied shelf space) or large (2/3 emptied shelf space) level of depleted inventory. They received 10 Euro for their participation.

#### *Procedure*

A company that is specialized in designing virtual environments developed the virtual reality environment especially for this study. In the experiment, an introductory text informed participants that they would be exposed to a realistic supermarket setting. The virtual environment showed both the exterior and the interior of the supermarket. It did not visualize other shoppers, but contained emptied shelf space due to prior purchases. The computer led participants through the virtual environment, which gave a realistic impression of moving through a supermarket with 3D projections of the aisles and shelves, and with products from several product categories inserted (see Fig. 1 for sample screen shots). After moving through various aisles of the store, the consumer arrived at a wine shelf.

The participants' task was to choose a rosé wine. Wine choice is a common but somewhat risky and complex choice with few established preferences, and it has been used in previous scarcity research (Lynn, 1989). The wines were 3D objects in the virtual space, and as participants approached them the observation angle and product view changed accordingly. The assortment contained six French rosé wines, of identical

Fig. 1. Screen shots of the virtual environment in Experiment 1.

size and harvest year. To ensure that the pictures were realistic, a pretest was conducted in which 22 participants provided feedback on several pictures of wine bottles. The selected pictures contained bottles with a natural wine color and a neutral label. By clicking with the mouse on a wine bottle, participants could view a shelf tag with additional information about the wine, as if they would read the back label. Each wine was described with four randomly assigned attributes (e.g., fruity, subtle, refreshing, soft aroma). In a pretest the selected attributes received equal liking ratings. Part of the inventory on the shelf was depleted for one of the wines. During the supermarket visit, participants viewed other product categories with varying inventory levels (fruit and vegetables, dairy, coffee, ready-made meals, rice, and detergents), and made one additional choice (gourmet soup) to increase realism.

*Measures*

Participants selected the wine they wanted to buy. Before making their choice, they could click on the wines to view a shelf tag with additional information. The computer recorded which wines were examined and for how long. The following measures were derived from this information: the amount of time spent examining the shelf tags, the number of times clicked to view a shelf tag, the relative amount of time spent examining the wine with depleted inventory compared to the total time, and the proportion of clicks received by this wine. Rather than using direct inquiries, which might cause consumers to form inferences that would not have occurred in reality (Kardes et al., 2004), we relied on these process measures to gauge the depth of information processing during inference making and choice.

*Results and discussion*

As predicted, relative scarcity increased choice. Eighteen participants (27%) chose the scarce wine, which is significantly larger than the expected 17% (1 out of 6) if choice would have been random (binomial test, $p<.05$). This is first evidence that traces of others' behavior can indeed instigate a bandwagon effect. In addition, the level of depleted inventory affected choice. Choice for the scarce product was higher when 2/3 of the inventory was depleted (chosen by 14 out of 36 participants, or 39%) than when 1/3 of the inventory was depleted (chosen by 4 out of 32 participants, or 13%), $\chi^2(1, N=68)=6.06$, $p<.05$.

Next, we examined the clicks on shelf tags. If emptied shelf space operates as a heuristic to simplify choice, we would expect participants to spend less time overall and click less often on shelf tags. In contrast, if emptied shelf space stimulates active inference making about the scarce product, we would expect a difference in relative rather than absolute time and click measures due to a shift in attention. A higher proportion of the inspection time and clicks for additional information should then go to the scarce product, which is exactly what we found. That is, the level of inventory depletion did not affect the total time spent examining shelf tags nor the total number of clicks on shelf tags, $ts(1, 66)<.77$, *ns*. However, consistent with the idea that higher levels of inventory depletion lead to more cognitive elaboration and inference making, participants spent more time examining the scarce wine when inventory depletion was high ($M=.20$) rather than low ($M=.14$), $t(1, 66)=2.62$, $p<.05$. The proportion of clicks going to the scarce wine also tended to be higher under high ($M=.19$) than low levels of inventory depletion ($M=.16$), $t(1, 66)=1.87$, $p=.066$.

In sum, in a representative sample of consumers in a realistic shopping situation, we indeed found that scarcity due to excess demand, in the form of emptied shelf space, increases choice. This observed bandwagon effect is at variance with the predictions of uniqueness theory. In addition, the effect on choice is stronger when the level of inventory depletion is higher, and consumers spend more time examining the scarce product in this condition as well. This provides first support that consumers incorporate inventory levels in preference formation and choice. Experiment 1 did not examine the content of the preference formation processes, that is, which inferences consumers made. Experiment 2 will further examine consumers' response to different inventory depletion levels, and includes direct measures of quality inferences to test whether these indeed influence choice.

## Experiment 2: Quality inferences due to depleted inventory

The main objective of the second experiment is to examine the inferences that consumers make based on scarcity due to excess demand. Excess demand implies popularity, and we predict that excess demand can lead to inferences of higher quality and to increased product choice.

*Method*

*Participants and design*

Participants were 156 students (54 males and 102 females, $M_{age}=21.1$ years, all participants were over the local legal drinking age) who participated in a 3 (level of inventory depletion: low, medium, high)×2(scarcity: scarce vs. non-scarce product) mixed design with repeated measures on the second factor.

*Procedure*

The experiment was administered on personal computers using the program Authorware (Kellogg & Bhatnagar, 2002). To prevent that participants would attribute the relative scarcity to supply limitations, the introductory text pointed to additional inventory in the back of the store. The introductory text read: "Imagine it is a Saturday, end of the afternoon, and you are expecting guests this evening, for which you will prepare an Italian meal. You want to serve an Italian wine and go to the wine store. The store is rather crowded. Both employees are busy helping customers behind the counter. Full cases of wine are standing in the back of the store, because the employees didn't have the time to place these on the shelves. You hesitate between two types of Italian wines, located next to each other on the shelf." Next, participants saw a store shelf with two wines, one fully stocked (six facings with a second row of bottles visible behind the first) and one not fully stocked.

Depleted inventory was manipulated at three levels: 2, 3, or 4 facings, with an equal number of wines visible in a second row behind these facings (i.e., the shelf contained 4, 6, or 8 out of 12 possible bottles of wine).

Prices were indicated and identical for both products. Additional information concerned the type of grape (Sangiovese or Verdicchio), aroma (classical aroma or pleasant aroma), experience (splendid tension arch or playful with pleasant tannins), and taste (full taste or round taste). These descriptions were pretested to provide equally attractive and general information. Descriptions, assignments of the scarce product, and order of products on the shelf were randomized. Participants took about 10 min to complete the experiment and received a free product (chips, chocolate bar, or similar product) for their participation.

*Measures*

Participants indicated which of the two products they would buy. For both products they completed items on perceived quality, on 9-point scales with semantic differentials (five items; 'this wine is unattractive–attractive', 'I would probably be dissatisfied–satisfied about this wine', 'this wine probably has a bad taste–good taste', 'I think this wine is undesirable–desirable', and 'I think this wine is of low quality–high quality', average $\alpha = .89$). In addition, product popularity for both products was measured on 9-point scales labeled 'totally disagree' to 'totally agree' (three items: 'this wine is popular', 'I think that many people want to buy this wine', and 'this wine is sold well', average $\alpha = .91$). A manipulation check of the amount offered by the store was included (four items: 'the store offers enough of this wine to its customers', 'I think that this wine is offered in large amounts by the store', 'when somebody wants to buy this wine tomorrow it will probably still be in stock', and 'there is enough available for anyone wanting to buy this wine', average $\alpha = .75$).

*Results and discussion*

A repeated measures ANOVA for the manipulation check showed that participants thought that the scarce wine was less available than the non-scarce wine ($M_{scarce} = 4.84$, $M_{non\text{-}scarce} = 7.38$), $F(1, 153) = 355.82$, $p < .001$. This effect was stronger for higher levels of inventory depletion, as evidenced by the significant scarcity × inventory depletion level interaction, $F(2, 153) = 6.34$, $p < .01$, which revealed the success of our manipulation.

*Product popularity*

Table 1 provides means and standard deviations. Supporting our prediction that scarcity due to excess demand indicates that the scarce product is popular, and thus not exclusive, participants indeed thought that the scarce wine was more popular than the non-scarce wine ($M_{scarce} = 7.00$, $M_{non\text{-}scarce} = 4.71$), $F(1, 153) = 121.83$, $p < .001$. The interaction of scarcity with inventory depletion level was significant as well, $F(2, 153) = 3.14$, $p < .05$, indicating that participants thought there was a larger difference in popularity between the scarce and non-scarce product when the depleted inventory was larger.

Table 1
Inferences of product popularity, quality, and choice for scarce and non-scarce product as a function of inventory depletion level, >Experiment 2

| | Inventory depletion level | | |
|---|---|---|---|
| | Low 1/3 depleted ($n = 53$) | Medium 1/2 depleted ($n = 51$) | High 2/3 depleted ($n = 52$) |
| Popularity | | | |
| Scarce product | 6.72 (1.42) | 7.09 (1.22) | 7.18 (1.27) |
| Non-scarce product | 5.16 (2.03) | 4.51 (1.88) | 4.45 (1.58) |
| Quality | | | |
| Scarce product | 6.40 (.96) | 6.51 (1.16) | 6.38 (1.20) |
| Non-scarce product | 6.05 (1.28) | 5.43 (1.55) | 5.65 (1.26) |
| Choice[a] | | | |
| Scarce product | 30 | 34 | 37 |
| Non-scarce product | 23 | 17 | 15 |

*Note*. Means on 9-point scales with standard deviations in parentheses.
[a] Number of participants.

*Product quality*

As predicted, participants inferred that the scarce wine was of higher quality than the non-scarce wine ($M_{scarce} = 6.43$, $M_{non\text{-}scarce} = 5.72$), $F(1, 153) = 35.75$, $p < .001$. In addition, the interaction between scarcity and inventory depletion level was significant, $F(2, 153) = 3.04$, $p = .05$. Follow-up analyses revealed that participants inferred a larger difference in quality between the scarce and non-scarce product when inventory depletion was medium or high than when it was low, $F(1, 154) = 4.65$, $p < .05$, whereas the inferred quality difference did not differ when inventory depletion level was medium vs. high, $F(1, 101) = 1.25$, *ns*. This indicates that participants responded to inventory depletion, as Fig. 2 illustrates, but not similarly at all levels. When only 1/3 of the inventory was depleted, they made quality inferences ($M_{scarce} = 6.40$, $M_{non\text{-}scarce} = 6.05$), $F(1, 52) = 2.96$, $p = .05$, but these were weaker then when more of the inventory was depleted. At higher levels of inventory depletion, however, quality inferences did not increase linearly with level of depleted inventory, which is interesting.

*Product choice*

In further support of the predictions, 101 of 156 participants (65%) chose the scarce wine, which is significantly larger than the expected 50% (78) if choice would have been random, binomial test, $p < .001$, as Fig. 3 illustrates. Importantly, a logistic regression explaining choice of the scarce product from quality inferences shows that both the inferred quality of the scarce product, $\beta = 2.55$, Wald = 6.40, $p < .05$, and the inferred quality of the non-scarce product, $\beta = -2.87$, Wald = 6.05, $p < .05$, impact choice. The level of depleted inventory, in contrast, did not influence product choice, $\chi^2(1, N = 156) = 2.56$, *ns*, showing that even fairly small amounts of relative scarcity already influenced choice.

Although consumers believe that excess prior demand for a product is evidence of its popularity, which shows that the product is not exclusive, they still preferred the scarce product.

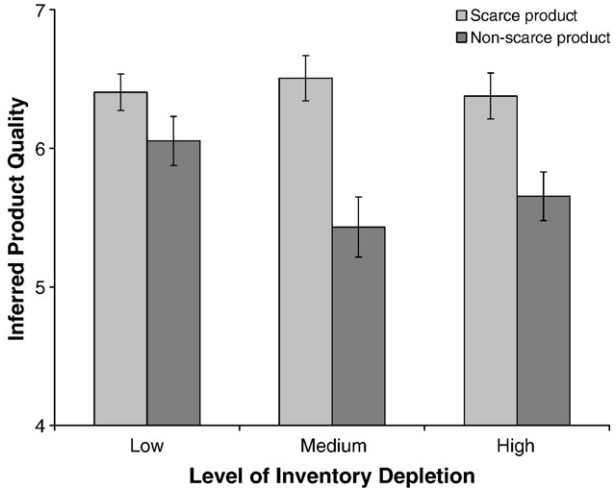


Fig. 2. Product quality for the scarce and non-scarce product as a function of inventory depletion, Experiment 2 (Error bars represent 1 SE+/−the mean).

In line with Experiment 1, this supports the bandwagon effect for scarcity due to excess demand. Consumers choose the scarce product over the non-scarce product in the absence of uniqueness. Surprisingly, choice does not increase with the level of depleted inventory, whereas perceived quality differences partly do. At *all* levels of inventory depletion, consumers believe that the scarce product is of better quality than the non-scarce product, and they choose it more often. Quality inferences are stronger when inventory is depleted to a higher extent, but this increase levels off. Consumers thus appear to take prior demand as evidence of product quality, but the connection between the exact level of prior demand and the magnitude of perceived quality differences between products is not linear. For product choice, the effect of the level of inventory depletion is even absent, implying that consumers are not automatically quicker to jump on the bandwagon when more others have already done so.

## Experiment 3: Scarcity and identity

With our final experiment we intend to reveal a case where bandwagon effects reverse when scarcity is due to excess demand, and not when there is firm-induced lack of supply. The reversal is most likely to occur for product categories that are important for a consumer's identity and in which it is undesirable to encounter someone with an identical product. We chose the product category of shirts for the experiment, because fashion items are indicative of identity expression, as shown in a pretest and from common observation. Except in highly regulated situations (school uniforms, team sport clothing), encountering someone with an identical product threatens one's sense of uniqueness and is therefore generally undesirable in this category.

### *Method*

#### *Participants and design*

Two hundred undergraduate students participated in a 2 (scarcity cause: excess demand vs. limited supply)×2(store location: nearby vs. distant)×2(scarcity: scarce vs. non-scarce product) mixed design with repeated measures on the third factor.

#### *Procedure*

Participants read a description of a visit to a clothing store, where they needed to choose between two shirts, one of which was scarce. The manipulation of spatially close vs. more distant others required social groups that differed in the degree to which participants encountered members on a day-to-day basis, but not in their evaluation of the group, nor in their similarity to group members. In a pretest, we therefore asked 20 students who were not part of the main experiment to rate 10 different groups of people (e.g., fellow students, managers from middle-sized companies, university staff, professional athletes) on these three variables using 7-point scales. Results showed that participants evaluated students from their home town similarly to students from a town on the other side of the country (measured on a negative-positive scale, $t(19)=1.80$, $p>.05$), whereas many other groups significantly differed from each other. Additionally, ratings for similarity to group members also did not significantly differ between the two student groups, $t(19)=1.53$, $p>.05$. Finally, and crucially, participants indicated that they were more likely to encounter students from their own university ($M=6.80$) than students from the other university ($M=2.85$), $t(19)=10.58$, $p<.001$. We thus manipulated the distance of other potential buyers by either locating the store in the students' university town (a small town with few clothing stores aimed at students) or another university town at the other side of the country. Cause of scarcity was manipulated by having a salesperson mention excess demand or limited production quantities for the minimal inventory level. As an example, the instruction for the nearby store, excess demand condition was:

> Imagine: you are visiting a clothing store in [name of the university's home town] to buy a shirt. Because the store is familiar among students from [name of local university],

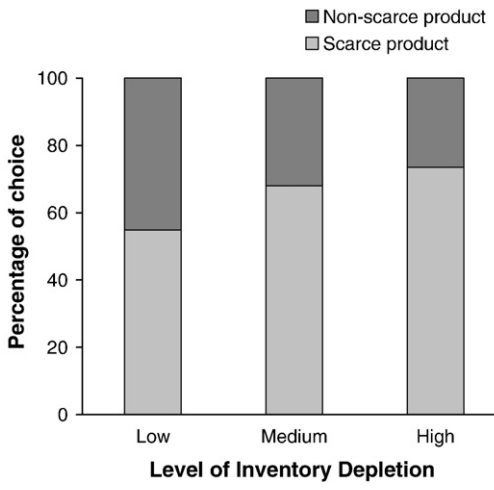


Fig. 3. Choice share of the scarce and non-scarce product as a function of inventory depletion, Experiment 2.

you have regularly seen students wearing the clothes that are sold here. You notice two nice shirts in the clothing store. Of one shirt there are only two items in the rack, whereas there are plenty of items of the other shirt. The shirts have the same price, but differ in material and design. Both shirts suit you. The saleswoman tells you that the store has so few of the one shirt because this shirt has been sold a lot.

*Measures*

Participants indicated which shirt they would buy, and responded to 9-point semantic differentials on product popularity (two items: 'not popular–popular' and 'not in demand–in demand'), exclusiveness (three items: 'not exclusive–exclusive', 'regular–special', and 'not unique–unique'), and preference (two items: 'would not buy–would like to buy' and 'not for me–for me').

*Results and discussion*

*Inferences of popularity and exclusiveness*

Table 2 provides means and standard deviations. As predicted, inferences of popularity depended on the cause of scarcity, $F(1, 196)=128.12$, $p<.001$, with participants inferring that the scarce product was more popular than the non-scarce product for demand-caused scarcity ($M_{scarce}=7.64$, $M_{non\text{-}scarce}=3.58$), $F(1, 95)=462.49$, $p<.001$, but not for supply-caused scarcity, $F(1, 101)=.39$, *ns*. Store location did not affect inferences of popularity, $F(1, 196)=1.01$, *ns*, indicating that participants perceived excess demand as a sign of popularity, irrespective of whether this demand came from students of their own university or from more distant students from the other university.

Inferences of exclusiveness also depended on the cause of scarcity, $F(1, 196)=245.66$, $p<.001$, with participants inferring that the scarce product was more exclusive than the non-scarce product for supply-caused scarcity ($M_{scarce}=6.56$, $M_{non\text{-}scarce}=3.53$), $F(1, 101)=204.17$, $p<.001$, but inferring that the scarcity product was *less* exclusive than the non-scarce product for demand-caused scarcity ($M_{scarce}=3.33$, $M_{non\text{-}scarce}=4.95$), $F(1, 95)=62.45$, $p<.001$. Store location also affected inferences of exclusiveness, $F(1, 196)=7.82$, $p<.01$, and in the nearby store the scarce product was seen as less exclusive than in the distant store.

*Product preference and propensity to choose the scarce product*

Importantly and as we predicted, participants' preference for the scarce product compared with the non-scarce product depended on the three-way interaction between scarcity, the cause of scarcity, and store location, $F(1, 196)=4.78$, $p<.05$. For scarcity due to limited product supply, participants had a preference for the scarce product ($M_{scarce}=6.38$, $M_{non\text{-}scarce}=4.87$), $F(1, 101)=43.13$, $p<.001$, irrespective of store location, $F(1, 101)=.20$, *ns*. For demand-caused scarcity, however, preference for the scarce product depended on store location, $F(1, 95)=9.48$, $p<.01$. Participants appeared indifferent between the scarce and non-scarce product in the distant store, $F(1, 52)=.35$, *ns*, but disliked the scarce product in the nearby store ($M_{scarce}=4.43$, $M_{non\text{-}scarce}=6.50$), $F(1, 43)=21.71$, $p<.001$. In other words, supporting our prediction, possible ownership by close others of the same product (because of the nearby store) decreased the attractiveness of the scarce product for demand-caused scarcity but not for supply-caused scarcity. In this identity-relevant category, we thus found no bandwagon effect and, moreover, a complete reversal of the bandwagon effect when uniqueness was threatened by close others. This provides an important boundary condition for the bandwagon effect. Fig. 4 provides a graphical illustration.

Overall, 117 participants of 200 in the sample (59%) chose the scarce product, which is more than expected if choice would have been random, binomial test, $Z=2.4$, $p<.05$. As expected, the number of participants who chose the scarce product depended on the cause of scarcity and store location. For supply-caused scarcity, 86% choose the scarce product, and store

Table 2
Inferences of product popularity and exclusiveness, product preference, and choice for scarce and non-scarce product as a function of scarcity cause and store distance, Experiment 3

| Dependent variable | Reason for scarcity | | | |
|---|---|---|---|---|
| | Excess demand | | Limited supply | |
| | Nearby store ($n=44$) | Distant store ($n=53$) | Nearby store ($n=48$) | Distant store ($n=55$) |
| Popularity | | | | |
| Scarce product | 7.78 (1.08) | 7.52 (.94) | 6.13 (1.70) | 5.75 (1.57) |
| Non-scarce product | 3.59 (1.25) | 3.58 (1.42) | 5.73 (1.71) | 5.79 (1.84) |
| Exclusiveness | | | | |
| Scarce product | 2.98 (1.38) | 3.62 (1.32) | 6.19 (1.75) | 6.87 (1.16) |
| Non-scarce product | 5.08 (1.93) | 4.84 (1.74) | 3.60 (1.34) | 3.48 (1.30) |
| Preference | | | | |
| Scarce product | 4.43 (2.10) | 5.49 (1.86) | 6.24 (1.52) | 6.50 (1.46) |
| Non-scarce product | 6.50 (1.57) | 5.73 (1.97) | 4.84 (1.90) | 4.90 (1.52) |
| Choice[a] | | | | |
| Scarce product | 4 | 24 | 40 | 49 |
| Non-scarce product | 40 | 29 | 8 | 6 |

*Note*. Means on 9-point scales with standard deviations in parentheses.
[a] Number of participants.

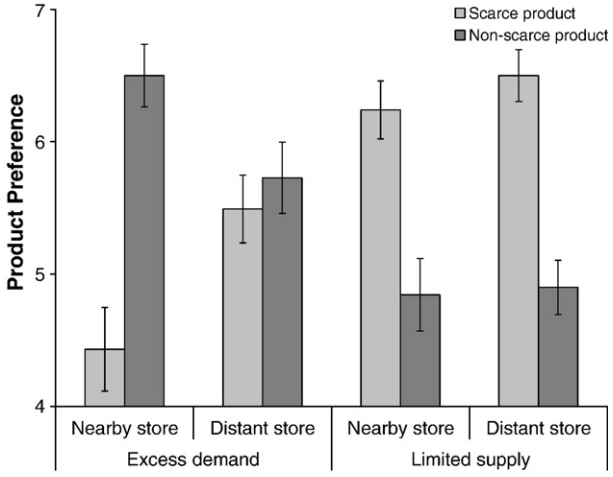


Fig. 4. Product preference as a function of scarcity cause and store distance, Experiment 3 (Error bars represent 1 SE+/− the mean).

location did not matter, $\chi^2(1, n=103)=.72$, *ns*. For demand-caused scarcity, however, more participants choose the scarce product in the distant store (45%) than in the nearby store (9%), $\chi^2(1, n=97)=15.34$, $p<.001$, as Fig. 5 illustrates. A logistic regression, in which choice of the scarce product (yes/no) was predicted from the cause of scarcity (coded as demand=1, supply=−1), store location (coded as nearby=1, distant=−1), and the interaction between these two factors, gave similar results with a significant main effect for the cause of scarcity, $\beta=-1.55$, Wald=55.88, $p<.001$, a significant main effect of store location, $\beta=-.65$, Wald=9.85, $p<.01$, and a significant interaction effect, $\beta=-1.62$, Wald=3.83, $p=.05$. Thus, in support of our predictions, the possible ownership by close others decreased product choice when scarcity was caused by excess demand.

This final experiment provides two important insights. First, the cause of scarcity matters for consumers. Consumers respond differently to demand-induced vs. firm-induced scarcity and the relevance of potential other buyers moderated one but not the other effect. Second, there are important and common situations where bandwagon effects do not occur. When products are important for establishing and communicating consumers' unique identity, bandwagon effects can be tempered, especially when close others may own an identical product.

## General discussion

Relative scarcity due to excess demand can result in bandwagon effects that uniqueness theory cannot account for, and thus operates in a different way than absolute scarcity due to limited product supply. This has implications for commodity theories of product value. Contrary to the prediction of uniqueness theory, consumers do not choose for a more exclusive yet abundantly available product. Instead they choose for the clearly popular product in high demand, which is currently less available at the point of purchase as evidenced by empty shelf space. This shows how demand can accelerate demand. This preference for the scarce product with high prior demand, however, reverses when spatially close others could have bought the product. This threat to their desire to be unique, as commonly occurs, leads consumers to avoid jumping on the bandwagon, and then product popularity backfires.

Product scarcity due to excess demand has received relatively little research attention, which is surprising given how pervasive such scarcity situations are in actual and virtual stores. Not only do inventory levels in a store communicate product demand, consumers can, for example, easily notice how many others visit a restaurant (Becker, 1991) or how many times a software program is downloaded from the internet (Hanson & Putler, 1996). Product popularity can become evident in other ways then through product scarcity, such as through top-selling lists and announcements of prior sales. Our findings generalize to these situations, and, more generally, show when popularity stimulates demand and when it does not. These effects even occur when only traces of others' behavior are available. Thus, consumers need not meet or even observe others to still obtain information about their behavior and to act on this information.

When many others have bought a product, consumers may infer that it must be of good quality. There is an indication that this inference partly depends on the degree of excess demand: the more others have previously bought a product, the better it must be compared with alternatives. This suggests that consumers may not completely take into account that excess demand can have driven the choice behavior of others. In extreme cases, this could lead to information cascades or "market bubbles", in which people construct their choices from the context (i.e., choose the product in highest demand) and mindlessly follow the herd (Amir & Levav, 2008; Lux, 1995). Often, however, at least some consumers know which brand and variant they want to buy, even before they enter a store or observe the behavior of others. Private information then is conclusive for them, which prevents the occurrence of cascades and may ultimately lead to convergence upon the better decision (Bikhchandani et al., 1998). Generally, then, jumping on the bandwagon to follow the behavior of others can be beneficial, especially for consumers whose private information is

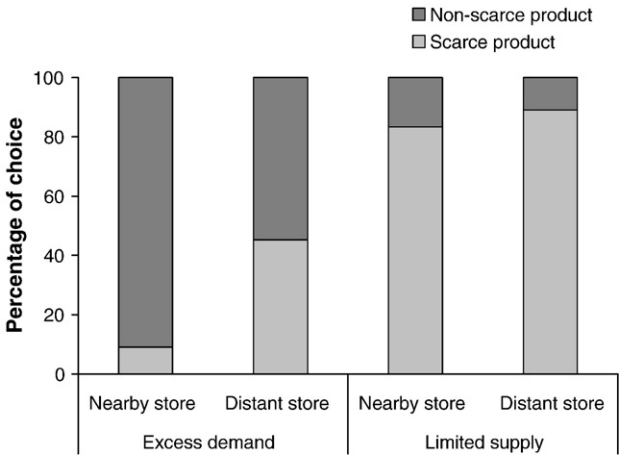


Fig. 5. Choice share of the scarce and non-scarce product as a function of scarcity cause and store distance, Experiment 4.

inconclusive, that is, who are uncertain about the quality of products, which is necessary for consumers to make quality inferences based on scarcity.

The scarcity effects that we find have implications for inventory management, as keeping shelves fully stocked may have unexpected effects on sales. Emptied shelf space may not necessarily represent lost opportunities, but instead can actually stimulate product sales. Of course, this empty shelf space only signals product popularity when it distinguishes the scarce product. When all products have low inventory levels, consumers will not infer popularity for one of the products, but may rather attribute the empty shelf space to poor inventory control of the store, and bandwagon effects will not occur. Additionally, retailers risk out-of-stock effects when demand accelerates to a point where product inventory becomes completely depleted. This results in dissatisfied consumers (Fitzsimons, 2000) and may be more adverse than the positive effects of accelerated sales for partly emptied shelves, as follow-up research may examine.

A limitation of the present study, and a potential avenue for future research, is that the level of depleted inventory was limited to a range of 4 to 8 products. Prior research has examined consumers response to demand levels for downloads of software programs, where the level of prior demand was much higher (sometimes more than 100 prior downloads; Hanson & Putler, 1996). There, high levels of prior demand stimulated choice much more than medium degrees of prior demand, whereas the present study did not find such differences. Future research could further examine consumers' response to different levels of prior demand. Lastly, consumer responses to actual or presumed scarcity may lead to self-fulfilling prophecies such as when consumers withdraw their deposits from banks that appear or are rumored to be insolvent, which then become so, as developments in financial markets in recent years have shown. Research on how to prevent such extreme information cascades is needed too.

In conclusion, the present research shows that scarcity effects on preference and choice also occur when uniqueness concerns are not at stake. Consumers infer that scarcity due to high demand implies product quality, and decide to buy the scarce product. In these cases consumers readily follow the trail of the bandwagon.

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