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UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF CALIFORNIA

BEHRAD MANOUCHEHRI, on behalf of himself and all others similarly situated, Plaintiff, vs. THE ESTEE LAUDER COMPANIES INC. and ARAMIS INC., Defendants.	Case No. **'14CV1064 JM KSC** **CLASS ACTION COMPLAINT** JURY TRIAL DEMAND

Plaintiff, by his attorneys, on behalf of himself and all others similarly situated, makes the following allegations based on the investigation of counsel and based upon information and belief, except as to those allegations specifically pertaining to himself and his counsel, which are based on personal knowledge.

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NATURE OF THE ACTION

1. Defendant, The Estee Lauder Companies Inc. (together with Defendant ARAMIS INC. "Estee Lauder" or "Defendants") is a self-proclaimed "pioneer in the cosmetics industry"[1] with more than $10.2 billion in annual sales. More than 44 percent of those sales are generated by Estee Lauder's skin care products, which constitutes its "most profitable product category."[2]

2. Estee Lauder enjoys such significant sales, in part because of its false, deceptive, and/or misleading representations that products from its LAB Series skincare for men collection, specifically MAX LS Overnight Renewal Serum, MAX LS Instant Eye Lift, MAX LS Light Moisture Lotion, and MAX LS Age-Less Face Cream (collectively "MAX LS Products") have certain age-negating effects on the human skin.

3. Estee Lauder's primary marketing message for the MAX LS Products focuses on the discovery and promotion of "Sirtuin technology," represented to be a "Molecular Age-Less complex" which Defendants represent helps the skin "boost its natural ability to counteract visible signs of aging,"[3] while also promoting a "noticeably more lifted, firmer and resilient look"[4] to help "skin look younger, longer."[5] According to Estee Lauder's marketing, MAX LS Products are "powered by technology, backed by scientific research, and reinforced by years of success in addressing men's skincare and grooming needs."[6] Estee Lauder claims that its MAX LS products

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[1] Estee Lauder's 2013 10-K SEC Filing at 2.
[2] Estee Lauder's 2013 10-K SEC Filing at 26.
[3] *See* MAX LS Product Inserts.
[4] *Id*.
[5] *See* MAX LS Product line.
[6] http://www.labseries.com/get_started/index.tmpl.

bring consumers the most "high-tech, high-performance skincare for men"[7] including "the latest in anti-aging."[8]

4. Estee Lauder supports its efficacy promises for the MAX LS Products with misleading references to Sirtuin technology, clinical tests, and scientific research.

5. Defendants' marketing strategy promoting the efficacy of the MAX LS Products has been developed to be uniform across the entire product line and echoes across all forms of MAX LS Product marketing and advertising. That is, regardless of whether the advertising for the MAX LS Products appear in print (magazine or newspaper), on Estee Lauder's website, on third-party retailer websites, on product brochures, product displays, or product packaging at the point of sale, Estee Lauder repeats substantially the same thematic marketing message and efficacy claims for the entire line of MAX LS Products.

6. In addition to making uniform efficacy claims, Estee Lauder's MAX LS marketing strategy is also designed to create a uniform look and high-end theme for all of its MAX LS Products. For example, Estee Lauder uses the same images, graphics, and modern color scheme across its entire product advertising and packaging and rarely differentiates between MAX LS products in its advertising materials, frequently referring just to "Sirtuin technology" and the "molecular age-less complex." The MAX LS marketing campaign also frequently includes more than one MAX LS Product in the advertisements and Estee Lauder presents all the MAX LS Products as providing the same anti-aging efficacy based on the same purportedly cutting-edge Sirtuin technology.

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[7] *Id.*
[8] *Id.*

7.   This "high end" theme further deceived consumers by leading them to believe MAX LS is more effective than lower-cost moisturizers. Utilizing an artificially high price to falsely signal quality is an effective and well-documented marketing technique.[9] Since consumers do not have a method for objectively evaluating the quality of cosmetic products, they are especially likely to rely on price as a signal of quality when making such purchases.[10]

8.   Estee Lauder's public filings, such as its 2013 10-K, reaffirm this uniform marketing strategy, by admitting that each of its product lines, including MAX LS, "has a single global image, and is promoted with consistent logos, packaging and advertising designed to enhance its image and differentiate it from other brands."[11]

9.   As explained more fully herein, Estee Lauder has made, and continuous to make, deceptive, false, and/or misleading claims and promises to consumers about the efficacy of its MAX LS Products in a pervasive, nation-wide marketing scheme that confuses and misleads consumers about the true nature of the MAX LS Products. In reality, the MAX LS Products do not, and cannot, live up to the efficacy claims made by Estee Lauder because none of their ingredients can provide the promised results.

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[9] *See* Jukti K. Kalita et al., *Do High Prices Signal High Quality? A Theoretical Model and Empirical Results*, 13 J. PROD.& BRAND MGMT. (*4*)279 (2004) (Ex. 1).

[10] Erich Kirchler, Florian Fischer, & Erik Holzl, *Price and its Relation to Objective and Subjective Product Quality: Evidence from the Austrian Market*, 33 J. CONSUM. POLICY 275, 278 (2010) (noting consumers tend to rely on price as a measure of quality when purchasing cosmetics and pharmaceuticals, which are complex because their "components or ingredients and their working mechanisms are difficult to understand and intransparent for laypersons," and observing only a very weak correlation between price and objective measures of product quality among health and cosmetics products: r=.06) (Ex. 2)

[11] Estee Lauder's 2013 10-K SEC Filing at 3.

10. Nevertheless, Estee Lauder designs its marketing and advertising campaign for the MAX LS Products to include indicia of scientific research and discovery and promises of specific results which misleads and deceives consumers. In sum, Estee Lauder dupes consumers with false and misleading promises that "Sirtuin technology" is essentially a fountain of youth that is scientifically proven to "counteract visible signs of aging"[12] and to help "skin look younger, longer."[13] Estee Lauder has built an entire marketing platform upon these misleading statements and profits at the expense of the consumers.

11. The faux imprimatur of science and academic research further deceives consumers, as consumers rely upon experts when selecting products with inscrutable qualities.[14]

12. Indeed, the reason consumers purchase MAX LS Products is to obtain the unique results that Estee Lauder promises for its MAX LS Products. But the real secret to the success of the MAX LS product line is not some magic "Sirtuin technology," but a slick and deceptive marketing campaign.

13. Estee Lauder's financial reports reveal that the company commits an overwhelming amount of its resources to marketing. According to its public filings, in 2013, Estee Lauder spent nearly $2.8 billion on marketing while it only spent $103.6 million on research and development—a ratio of more than twenty-seven to one.

14. As a result of Estee Lauder's pervasive and deceptive marketing campaign, consumers across the country, including Plaintiff and the other

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[12] http://www.labseries.com/products/6959/index.tmpl#.

[13] *See* MAX LS Product line.

[14] *See* Oliver Gergaud, Karl Storchmann, & Vincenzo Verardi, *Expert Opinion and Quality Perception of Consumers: Evidence from New York City Restaurants*, AAWE Working Paper No. 108 (2012) (noting and summarizing research demonstrating consumer reliance on expert opinions when purchasing products with quality levels that are difficult to assess *ex-ante*) (Ex. 3).

members of the proposed Class and California Subclass, suffered financial harm when they purchased skin-care products at premium prices that do not, and cannot, provide the results Estee Lauder promises.

15. Estee Lauder sells MAX LS Products to consumers in a different manner than less expensive wrinkle creams or moisturizers are sold, which enhances the perception that the MAX LS products are superior to other similar products.

16. While lower-priced cosmetic products are available on the shelves of drug stores and supermarkets at approximately $15.00 to $30.00 per package, the MAX LS Products are sold mainly over counters at high-end department stores or online on the Lab Series website for $45-$68. Sales persons who are specifically trained by Estee Lauder to sell its MAX LS Products staff the counters at retail department stores, where Estee Lauder also provides consumers access to product displays and sales brochures that regurgitate the same efficacy promises that purportedly distinguish the Max LS products from other much less expensive skin care treatments.

17. Accordingly, instead of making a side-by-side comparison of product packaging on store shelves, consumers of the MAX LS Products purchase these products almost exclusively by virtue of marketing campaigns that reach consumers before they enter the retail outlets and through counter sales and advertising displays, such as those pictured below:

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18. Indeed, Estee Lauder specifically mentions in its public filings, such as its 2013 10-K, that its "in-store displays are designed to attract new customers and introduce existing customers to different products in the line."[15] These in-store displays are a crucial part of Estee Lauder's marketing program, conveying superiority over other products.[16]

19. Plaintiff and other members of the Class and California Subclass were exposed to Estee Lauder's pervasive, deceptive and misleading advertising messages and material omissions regarding the efficacy promises of the MAX LS Products.

20. Plaintiff seeks relief in this action individually and on behalf of all purchasers in the United States of at least one of the MAX LS Products at any time from the date of product launch for each of the particular MAX LS Products to the present (the "Class Period") for violations of the California False Advertising Law, California Unfair Competition Law, and the California

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[15] Estee Lauder's 2013 10-K SEC Filing at 5.

[16] *See* Frank Alpert, Beth Wilson, & Michael T. Elliot *Price Signaling: Does it Ever Work?*, 2.1 J. PROD. & BRAND MGMT. 29 (1993) (Ex. 4).

Consumer Legal Remedies Act. Plaintiff also seeks relief individually and on behalf of a Subclass of residents of California for violations pursuant to the same legal theories.

THE PARTIES

21. Plaintiff Behrad Manouchehri is a citizen of the State of California, residing in San Diego. Plaintiff purchased the MAX LS Age-Less Face Cream from a Macy's department store located in the Fashion Valley Mall at 7007 Friars Road, San Diego, CA 92108, at full retail cost[17] during the Class Period, for personal use.

22. Plaintiff, prior to making his purchase, read and reviewed the representations made on the product packing and in reliance upon the efficacy claims identified herein and as made by Estee Lauder in in-store advertisements, including those appearing in Macy's, purchased the MAX LS Age-Less Face Cream.

23. Plaintiff also saw, read and relied on these same product efficacy statements at the point of sale, including Defendants' anti-aging claims stating the results of a clinical study, in making his decision to purchase the MAX LS Age-Less Face Cream at a Macy's department store located in the Fashion Valley Mall. The efficacy statements relied on by Plaintiff included, for example, the purported "scientific" benefits based on clinical testing, patents, and technologies like "Sirtuin technology" and the exclusive "Molecular Age-Less Complex" and claims that the MAX LS Products help the skin "boost its natural ability to counteract visible signs of aging,"[18] while also promoting a

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[17] The Prices Estee Lauder charges for its MAX LS Products are as follows: Light Moisture Lotion, $54 for 3.4 oz; Instant Eye Lift, $45 for 0.5 oz; Overnight Renewal Serum, $60 for 1 oz; Age-Less Face Cream, $68 for 1.7 oz.
[18] *See* MAX LS Product inserts.

"noticeably more lifted, firmer and resilient look"[19] to help "skin look younger, longer."[20] These false and misleading statements received by Plaintiff were material and influenced his decision to purchase a MAX LS Product. As a result of his purchase, Plaintiff suffered injury in fact and lost money. Had Plaintiff known the truth about Defendants' misrepresentations and omissions, he would not have purchased the Defendants' product.

24. Defendant, The Estee Lauder Companies Inc. ("Estee Lauder"), is a Delaware corporation with its principal place of business in New York, New York.

25. Defendant, Aramis Inc. ("Aramis"), is a Delaware corporation. Upon information a belief, Aramis Inc. is a wholly owned subsidiary of The Estee Lauder Companies, Inc.

26. Estee Lauder and Aramis are referred to collectively herein as "Defendants."

JURISDICTION AND VENUE

27. This Court has jurisdiction over this action pursuant to 28 U.S.C. § 1332(d) because there are more than 100 class members and the aggregate amount in controversy exceeds $5 million exclusive of interest, fees and costs, and at least one Class member is a citizen of a state different from Defendants.

28. Pursuant to 28 U.S.C. § 1391, venue is proper in this Court because Defendants conduct business in this District, Plaintiff made his purchase within this District, and a substantial part of the events, omissions and acts giving rise to the claims herein occurred in this District.

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[19] *Id.*

[20] *See* MAX LS Product line.

GENERAL FACTUAL ALLEGATIONS COMMON TO ALL CLAIMS

Sirtuin and Its Alleged Effects

29. Sirtuin or SIR2 are a class of proteins found in the skin and body that have been implicated in influencing a wide range of cellular processes such as aging.

30. Resveratrol (trans-3, 5, 4'-trihydroxystilbene) is a compound found largely in the skins of red grapes and speculated by some to have anti-aging properties when ingested. However, there is no accepted scientific link between topical Resveratrol and anti-aging properties.

31. Preliminary studies with Resveratrol have led some scientists to *speculate* that Resveratrol may extend lifespan. Wade, N., New Hints Seen That Red Wine May Slow Aging, NY Times (Nov. 30, 2008) (Ex. 5) Several studies have concluded that when *ingested* Resveratrol *might* activate Sirtuins and extend lifespan in various species, from yeast to worms to rodents.

32. Some studies have shown that there may be a link between Resveratrol and Sirtuins; specifically that SIRT1 (but not SIRT2) could be directly activated through an allosteric mechanism common to chemically diverse Sirtuin-activating compounds.

33. A 2003 study conducted by a team of Harvard scientists tested the effects of Resveratrol on obese mice. The obese mice that were dosed[21] with Resveratrol lived longer than the group of obese mice that were not given any Resveratrol.

34. Moreover, subsequent independent research has failed to replicate these results. In every experiment to date, Resveratrol has failed to extend the

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[21] The mice were given doses of resveratrol far higher than the miniscule amounts found in red wine.

lifespan of lean, genetically normal rodents. Limited human clinical trials have been completed. While the reported effects are often positive, Resveratrol may have lesser effects in humans. See Micronutrient Information Center: Resveratrol, Linus Pauling Institute (Dec. 2012).

35. Presently, research on Resveratrol and Sirtuin is still in its infancy stage and no study has proven the long-term effects of Resveratrol when ingested in humans. More importantly, no studies have shown *topical* application of Resveratrol to have any anti-aging effect on humans, rodents, or other organisms.

36. Nevertheless, following the 2003 study, Aramis and Estee Lauder made the erroneous representation that putting Resveratrol into *topical cream* will activate Sirtuins and reduce aging and the appearance of aging.

37. To the contrary, there is no evidence that Resveratrol, or any activation of Sirtuin, works on humans at all, much less when delivered topically to human skin. Even if Resveratrol activates Sirtuin, there is no evidence that doing so also improves the appearance of human skin or reverses the signs of aging.

Estee Lauder's Misleading Efficacy Claims for MAX LS Products

38. Estee Lauder's marketing materials claim that the MAX LS Products are "inspired by Sirtuin technology"[22] and contain "the exclusive Molecular Age-Less Complex"[23] so that "skin looks younger, longer."[24] Moreover, Estee Lauder claims that the MAX LS Products are "the proven anti-age skincare system engineered for men" as depicted in the pictures taken at a retail store:

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[22] *See* MAX LS Product line and product inserts.
[23] *Id*.
[24] *Id*.

39. Estee Lauder similarly claims throughout its marketing materials that MAX LS Products are formulated based on "technology, backed by scientific research, and reinforced by years of success in addressing men's skincare"[25] and conveys the misleading message that MAX LS Products can "reclaim your younger looking skin"[26]:

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[25] http://www.labseries.com/get_started/index.tmpl.
[26] *See* MAX LS Product line and product inserts.

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40. The product inserts for the MAX LS Products, which are included in the packaging materials, parrot these same anti-aging claims:

> **Scientists discovered that our skin contains longevity genes call Sirtuins that trigger cells to live longer when activated**. Inspired by Sirtuin technology – the Molecular AGE-LESS Complex found in the MAX LS treatment regimen helps to prevent and repair the signs of aging. Designed specifically for a man's skin, **this new, advanced technology works to prolong the skin cell's life resulting in both immediate and long term benefits.**

41. More specifically, Estee Lauder makes the following claims regarding its MAX LS Products:

- "The <u>proven</u> anti-age skincare system engineered for men."
- "Be Age-Less."
- "Reclaim your younger looking skin."
- "Inspired by Sirtuin technology and the science of skin cell longevity, the Molecular Age-Less Complex in Max LS helps erase the signs of aging"
- "Immediately reduces the appearance of lines and wrinkles."
- "skin tone is more even, pores are less visible and skin looks rejuvenated"
- "Skin is renewed as it looks firmer and more lifted."
- "Visible aging effects appear delayed."

- "Skin looks younger, longer."
- "Triggers a time-released multilevel renewal process while you sleep to continually increase the rate of cell turnover, revealing a smoother appearance in the morning."
- "Promotes a noticeably more lifted, firmer and resilient look."
- "Helps skin boost its natural ability to counteract visible signs of aging so skin looks younger, longer."
- "Immediately gives skin a tighter feel around the eye area and reduces the appearance of fine lines, wrinkles and crow's feet."
- "Dramatically de-puffs and reduces the look of dark circles."
- "Eye area looks smoother and more lifted so skin looks younger, longer."

42. Estee Lauder also makes the above claims directly on the packaging of the MAX LS Products itself:

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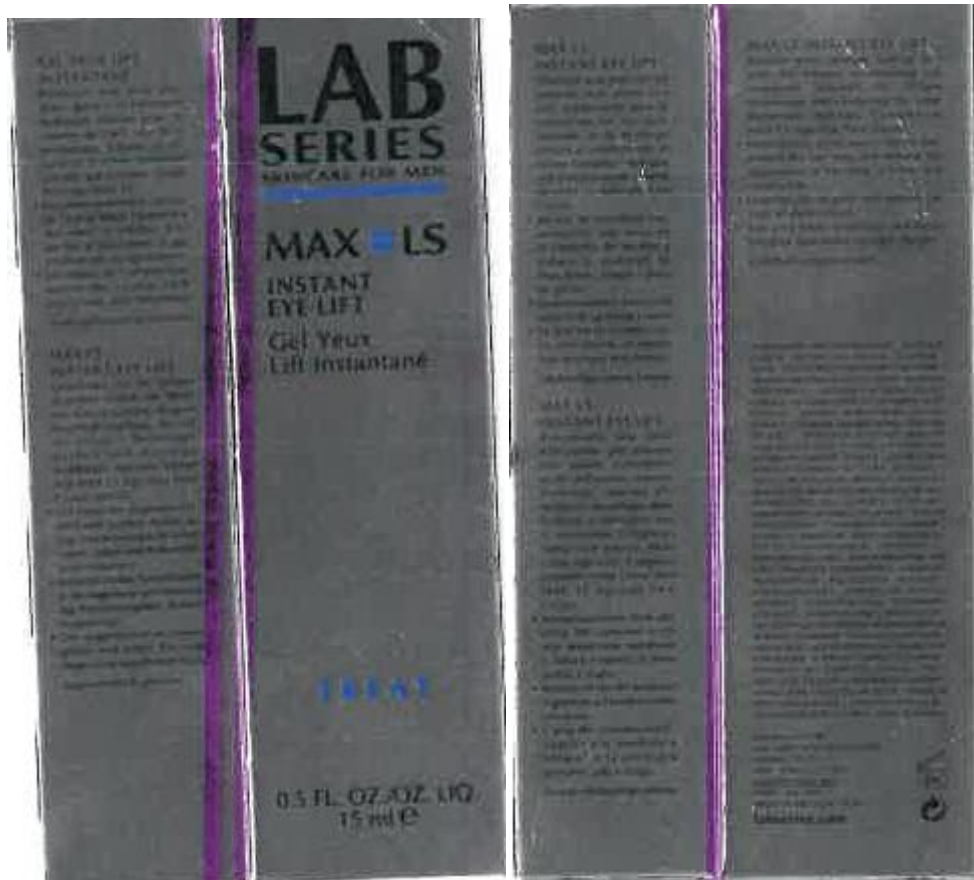12
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43. Estee Lauder's references to scientific research, skin cell behavior and skin repair unambiguously convey the misleading message to consumers that using the MAX LS Products will prevent and repair the signs of aging. In fact, the MAX LS Products cannot provide the promised results.

44. In its marketing materials for the MAX LS Products, Estee Lauder also provides a "Learn More about MAX LS" video, where consumers learn of the purported "genetic research" and "technology" that enables the MAX LS Products to provide the promised results. Specifically, Estee Lauder claims that the MAX LS Products ". . . help skin look younger, longer. It's inspired by the latest genetic research in Sirtuins genes that impact how cells age. Each product in the MAX LS system utilizes Sirtuin science in the molecular age-less complex to help extend the life span of youthful skin cells, slowing down the rate skin appears to age. The result, skin becomes more resistant to the visible effects of time."[27]

45. Estee Lauder goes as far as to state that after 4 weeks of testing, "88% of men experienced lifting and tightening in the eye area,"[28] "88% of men experienced firmer, smoother appearance and renewed skin,"[29] "90% of men saw reduction in the look of lines and wrinkles,"[30] and after eight weeks "98% of men saw boost in hydration."[31]

46. The point and theme of these misrepresentations is that Defendants' MAX LS products are worth the steep price premium over other skin creams because their innovative "Sirtuin technology" actually extends the life of your skin. Not only is this "technology" unproven, it does not reduce or reverse the aging of skin cells.

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[27] http://www.labseries.com/products/6959/index.tmpl#.
[28] *Id.*
[29] *Id.*
[30] *Id.*
[31] *Id.*

47. The purported active ingredients in the MAX LS Products are ineffectual, which means that the expensive MAX LS Products are no better than a generic moisturizer from the local drug store.[32]

48. To the extent consumers perceived *any* benefit from MAX LS above and beyond an ordinary skin cream, it would be the result the placebo effect. Consumers perceive higher-priced products as more effective and report greater benefits in comparison to lower-cost alternatives.[33] Moreover, due to the inherently subjective nature of anti-aging "results," the mere suggestion of efficacy bolstered by the faux imprimatur of science is likely sufficient for some consumers to observe "results."[34] Results based upon the placebo effect do no support Defendants' otherwise false claims, as deception is inherently a component of any placebo effect.

Misleading Use of Statistics

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[32] Whittemore Declaration.

[33] *See* Rebecca L. Waber et al, *Commercial Features of Placebo and Therapeutic Efficacy*, 299 JAMA 1016-17 (2008) (noting subjects report "higher-priced" placebos as more effective than "lower-priced" placebos, despite the lack of an actual difference) (Ex. 6); Baba Shiv et al, *Placebo Effects of Marketing Actions: Consumers May Get What They Pay For*, 42 J. MKTNG. RES. (4) 383 (2005) (observing subjects performing better and reporting greater efficacy of cold medicine when they used higher-priced versions of products that were identical, including branding) (Ex. 7).

[34] *See* B.L. Marks et al., *Psychophysiological Efficacy of a 2% Aminophylline-Based Thigh Reducing Cream*, 31(5) MED. & SCIENCE IN SPORTS EXERCISE S218 (1999) (reporting study where subjects believed their thighs had become smaller as a result of using a "thigh reducing cream," while actual measurements revealed the product had no effect) (Ex. 8); Nilufer Z. Aydinoglu & Aradhna Krishna, *Imagining Thin: Why Vanity Sizing Works*, J. CONS. PSYCH. (2012) (reporting that subjects perceived themselves as smaller at the mere suggestion of fitting into clothing one size smaller than their typical size) (Ex. 9).

49. Estee Lauder compounds this deception with its persistent use of scientific terms and phrases to make it appear as though MAX LS products are more advanced and more efficacious than other moisturizers. In fact, Estee Lauder routinely uses such phrases as "advanced technology," "scientific research," "clinical improvement," "clinical study," and others, in order to convince consumers that its MAX LS Products contain unique ingredients which have been scientifically designed and tested to provide the promised results: "skin that looks younger, longer."[35]

50. Estee Lauder also highlights its purported discovery of new ingredients and technologies which it claims not only make its products unique, but which also support its efficacy claim, such as its "exclusive Molecular Age-Less Complex."[36]

51. In fact, while the use of such seemingly scientific terms and claims of ingredient discovery provide the MAX LS Products with an increased level of credibility among unsuspecting consumers, and therefore increased sales, the purported scientific-sounding claims are simply part and parcel of Estee Lauder's deceptive and misleading advertising campaign.

52. Indeed, the clinical studies and other data that Estee Lauder represents as supportive of the claimed efficacy results are nothing more than a continuation of Defendants' misleading practices – each of the studies is designed specifically to be used in the marketing materials to support the claimed efficacy. Estee Lauder presents the "results" of a purported "clinical study" that claims "skin looks younger, longer"[37] in the following manner in the informational video found on its website for LAB Series:

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[35]*See* MAX LS Product line.

[36] *Id*.

[37] *Id*.

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26   53. These screen shots from the informational video purportedly state

27   the "results" of the "clinical study" of MAX LS, wherein after four weeks of

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testing, "88% of men experienced lifting and tightening in the eye area,"[38] "88% of men experienced firmer, smoother appearance and renewed skin,"[39] "90% of men saw reduction in the look of lines and wrinkles,"[40] and after eight weeks "98% of men saw boost in hydration."[41]

54. Accordingly, the claims made by this statistical presentation of the "results" of the "clinical study" is that 88 percent of consumers using MAX LS Products for four weeks can expect to see "lifting and tightening in the eye area" and a "firmer, smoother appearance and renewed skin" while 90 percent of consumers can expect to see a "reduction in the look of lines and wrinkles" and 98 percent of consumers can expect to see a "boost in hydration."

55. Because nothing in the MAX LS Products can lift and/or tighten the eye area, promote a "firmer, smoother appearance and renew skin," or reduce lines and wrinkles, this specific efficacy claim is deceptive and/or misleading.

The Effects of Defendants' Use of Scientific Data and Discovery

56. Making specific efficacy promises based upon "scientific" data and discovery further demonstrates that Defendants' claims are not mere puffery. Estee Lauder advertises that the MAX LS Products are "the proven anti-age skincare system engineered for men."[42] Indeed, if the MAX LS Products actually lift and/or tighten the eye area, promote a "firmer, smoother appearance and renew skin,"[43] reduce lines and wrinkles, or provided the other

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[38] http://www.labseries.com/products/6959/index.tmpl#.
[39] *Id*.
[40]*Id*.
[41]*Id*.
[42] *See* picture, supra at 11.
[43] *See* MAX LS Product inserts.

age-negating effects Defendants represent those products have, they would trigger regulation by the Food and Drug Administration as a drug.[44]

57. Estee Lauder relies on promises of specific results purportedly supported by the indicia of scientific reliability and discovery because such science-oriented promises and support for its efficacy claims make their efficacy promises more plausible to consumers. Those consumers are then more likely to purchase the high-priced MAX LS Products.

58. Even if one or more of Estee Lauder's claims is literally true, when viewed in their totality, the promises made by Estee Lauder regarding the efficacy of the MAX LS Products are nevertheless materially misleading to the average consumer and are therefore actionable.

59. In addition, regardless of whether the actual "clinical" studies or other tests referenced by Estee Lauder produced the claimed results, the references to such "clinical" studies or tests as being indicative of results for consumers generally in actual use of the MAX LS Products is misleading and deceptive. Indeed, these "data" are part and parcel of Estee Lauder's false, misleading, and/or deceptive advertising for its MAX LS Products.

60. Moreover, the active ingredients in the MAX LS Products are not effective and certainly have not been "proven," which means the expensive MAX LS Products are no better than a generic moisturizer from a local drug store.

Internet and Television Marketing

61. Estee Lauder's Internet marketing for its MAX LS Products includes, among other things, video presentations, statistical data, and a Facebook page. Many of its commercials and promotional videos are also readily accessible on youtube.com and other third-party websites. Each of

[44] FD&C Act, 201(g).

these sources repeat the same central marketing theme as the other MAX LS advertisements, and provides consumers access 24 hours a day, 7 days a week, to Estee Lauder's deceptive advertising campaign for the MAX LS Products.

Print Media and Sales Brochures

62. Estee Lauder also markets its MAX LS Products in print media, including advertisements in widely circulated magazines and newspapers such as the *New York Times*, *Male Critique*, *Men's Health*, and *Allure*, among others.

63. The specific dates and places of publication of each of Estee Lauder's advertisements for the MAX LS Products are in Estee Lauder's possession, custody or control.

64. Some of the examples of Estee Lauder's magazine advertising include the following, which repeat the same efficacy claims as the online and in-store marketing materials:

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65. Estee Lauder's sales brochures, which are made available at department stores where the MAX LS Products are sold, echo the same message as the other forms of Estee Lauder's marketing.

Sales Representatives

66. Estee Lauder provides training and disseminates uniform information to "Estee Lauder Beauty Advisors" regarding its MAX LS Products. These sales representatives are paid and extensively trained by Estee Lauder to parrot and reinforce the *same* false promises as contained in Estee Lauder's other forms of advertising to all potential customers. Estee Lauder even sends its marketing and sales executives into the field to meet with consumers and key retailers and to consult with Estee Lauder Beauty Advisors at each retail location to ensure the marketing message is consistent at all points of sale.

The Results of Estee Lauder's Deceptive Conduct

67. Estee Lauder's uniform marketing campaign leaves consumers with the mistaken belief that its MAX LS Products are uniquely able to provide certain permanent age-negating effects on human skin. Specifically, Estee

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Lauder advertises in retail stores that the MAX LS Products are "***the proven anti-age skincare system engineered for men***."[45]

68. In addition to the material misrepresentations as described herein, Defendants' conduct is likewise actionable based on their material omissions, which similarly induced Plaintiff and the other members of the Class and Subclass to purchase the MAX LS Products.

69. For example, Defendants have failed to disclose, *inter alia*, the following:

- That the active ingredients in MAX LS Products that purportedly distinguish them from other moisturizers are not effective and do not provide the promised benefits;

- That none of the MAX LS Products can "help reduce the signs of aging"; "immediately reduce the appearance of lines and wrinkles"; promote "a noticeably more lifted, firmer and resilient look"; "dramatically de-puff[] and reduce[] the look of dark circles"; or "help[] skin look younger, longer."

- The Defendants references to results from "clinical" and other "tests" and "studies" will not translate to actual results for consumers;

- That Defendants' "clinical studies" are not scientific and are instead designed to support Defendants' marketing materials.

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[45] *See* picture, *supra* at 11.

- Topical application of "Sirtuin technology" and/or Resveratrol has not been shown to (and does not) reduce the signs of aging.

- Topical application of "Sirtuin technology" and/or Resveratrol has not been shown to (and does not) help reduce lines and wrinkles.

- Topical application of "Sirtuin technology" and/or Resveratrol has not been shown to (and does not) provide any benefit to the skin.

70. Estee Lauder is in a position to actually know, or should know, that Resveratrol or "Sirtuin technology" does not deliver the promised results and that its MAX LS Products do not contain any ingredients or combination of ingredients that can repair past damage, effect a dramatic reduction in the visible signs of aging, promote noticeably more lifted, firmer and resilient skin, or provide any of the other promised permanent results. Estee Lauder fails to disclose that its MAX LS Products do not provide the permanent results as promised.

71. Until such time as Estee Lauder ceases to engage in deceptive and misleading advertising of the MAX LS Products, Plaintiff and the other members of the Class and Subclass will continue to be harmed.

72. As a result of the aging population, consumers are increasingly susceptible to such deceptive marketing and advertising.

73. Estee Lauder has succeeded in its deceit and has in fact enjoyed substantial profits from its deceptive campaigns. Such profits, if any, would

not have been nearly as large but for Estee Lauder's deceptive and misleading MAX LS marketing and advertising campaign.

74. Estee Lauder sets the price and charges a premium for its MAX LS Products. Plaintiff and the other members of the Class and Subclass would not have paid premium prices for the MAX LS Products – or would not have bought them at all – had they not been exposed to Estee Lauder's false or deceptive advertising about the MAX LS Products and had, instead, known the truth regarding Estee Lauder's deceptive marketing promises and omissions relating thereto.

75. Moreover, Plaintiff and the other members of the Class and Subclass believed the MAX LS Products would provide the promised age-negating benefits as detailed herein. In reality, although Plaintiff and the other members of the Class and Subclass paid premium prices for these purportedly unique MAX LS Product benefits, they did not get what they paid for. Instead, the MAX LS Products that Plaintiff and the other members of the Class and Subclass purchased did not provide the promised age-negating results.

76. As a result, and because of Estee Lauder's deceptive marketing, Plaintiff and the other members of the Class and Subclass have been harmed as a result of their purchases of the MAX LS Products.

77. Without knowing the truth about the lack of efficacy of the MAX LS Products, Plaintiff and the other member of the Class and Subclass paid premiums for MAX LS Products and/or received totally worthless products.

THE DECLARATION OF JERRY WHITTEMORE

78. Jerry Whittemore received his doctorate from University of Southern California in 1959 and has been a California Registered Pharmacist since then. Since approximately 1964, he has been a Supervisor of Drug Testing, a Manager and Director of Research and Development and a Vice President of

Science. In the last 17 years, he has been the President of a Cosmetic/Pharmaceutical research laboratory in Los Angeles, California.

79. As an expert in pharmaceutical chemistry and biochemistry, as well as a research director for a large prescription dermatology firm, Stiefel (a division of Glasco), he has developed many dermatologicals.

80. Mr. Whittemore has studied at length the ingredients, advertising, promotion, and claims of Estee Lauder's MAX LS products. He has also reviewed scientific literature and studies regarding "Sirtuin" technology to inform his opinions.

81. Mr. Whittemore opines there is no good and accepted scientific evidence that supports Estee Lauder's claim that "Sirtuin technology" purportedly found in its MAX LS Products has any impact on the skin or aging process when applied topically. **Exhibit 10** at ¶4.

82. Mr. Whittemore also found that Estee Lauder's MAX LS Products are not a "proven anti-age skin system" as advertised. **Exhibit 10** at ¶4. He further opines that there is no evidence that "sirtuin technology" purportedly found in the MAX LS Products has any positive impact on aging or skin above and beyond the impact provided by garden variety moisturizing cream. **Exhibit 10** at ¶4.

83. Mr. Whittemore points to seven studies which reinforce his opinions, explaining these studies are survey papers typical of those supporting topical sirtuin mitigators and/or oral administrated Resveratrol. None of the studies, however, actually deal with topical application of Resveratrol. He opines that in no situation can these studies be deemed "proven anti-age skin science" as suggested by Estee Lauder. **Exhibit 10** at ¶4.

84. Based on his decades of experience in the field and his review of the relevant scientific literature, Mr. Whittemore concludes that Estee Lauder's

statements for its MAX LS Product line are false and deceptive. **Exhibit 10** at ¶4.

CLASS ACTION ALLEGATIONS

85.   Plaintiff brings this class action pursuant to Fed. R. Civ. P. 23(a), (b)(1), (b)(2) and (b)(3) on behalf of the following nationwide consumer Class:

> All purchasers of any MAX LS Product in the United States. Excluded from the Class are Defendants, their parents, subsidiaries and affiliates, their directors and officers and members of their immediate families; also excluded are any federal, state or local governmental entities, any judicial officers presiding over this action and the members of their immediate family and judicial staff, and any juror assigned to this action.

86. Plaintiff also seeks to represent a California Subclass defined as:

> All residents of California who purchased any MAX LS Product. Excluded from the Subclass are Defendants, their parents, subsidiaries and affiliates, their directors and officers and members of their immediate families; also excluded are any federal, state or local governmental entities, any judicial officers presiding over this action and the members of their immediate family and judicial staff, and any juror assigned to this action.

87. Members of the Class and the California Subclass are so numerous that their individual joinder herein is impractical. Members of each of these

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classes number at least in the tens of thousands. The precise number of Class and California Subclass Members and their identities are unknown to Plaintiff at this time but will be determined through discovery.

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88. Common questions of law and fact exist as to all Class and California Subclass Members and predominate over questions affecting only individual Class Members. Common legal and factual questions include, but are not limited to:

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a. Whether Defendants advertise or market the MAX LS Products in a way that is false or misleading;

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b. Whether Defendants concealed from Plaintiff and the other members of the Class and California Subclass that their MAX LS Products do not provide the promised results;

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c. Whether, by the misconduct set forth in this Complaint, Defendants engaged in unfair, fraudulent or unlawful business with respect to advertising, marketing and sales of their MAX LS Products;

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d. Whether Defendants violated the Cal. Bus. & Prof. Code § 17500, *et seq*; Cal. Bus. & Prof. Code § 17200, *et seq*.; and/or Cal. Civ. Code § 1750, *et seq*.;

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e. Whether, as a result of Defendants' misconduct as alleged herein, Plaintiff and the other members of the Class and

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California Subclass are entitled to restitution, injunctive and/or monetary relief and, if so, the amount and nature of such relief.

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89. Plaintiff's claims are typical of the claims of the other members of the Class and California Subclass, as all members of the respective classes are similarly affected by Defendants' wrongful conduct. Plaintiff has no interests antagonistic to the interests of the other members of the Class and California Subclass. Plaintiff and all members of the Class and California Subclass have sustained economic injury arising out of Defendants' violations of common and statutory law as alleged herein.

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90. Plaintiff is an adequate representative of the Class and California Subclass because his interests do not conflict with the interests of the Class Members he seeks to represent, he has retained counsel competent and experienced in prosecuting class actions, and he intends to prosecute this action vigorously. The interests of Class and California Subclass members will be fairly and adequately protected by Plaintiff and his counsel.

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91. The class mechanism is superior to other available means for the fair and efficient adjudication of the claims of Plaintiff and the members of the Class and California Subclass. Each individual member of the respective classes may lack the resources to undergo the burden and expense of individual prosecution of the complex and extensive litigation necessary to establish Defendants' liability. Individualized litigation increases the delay and expense to all parties and multiplies the burden on the judicial system presented by the complex legal and factual issues of this case. Individualized litigation also presents a potential for inconsistent or contradictory judgments. In contrast, the class action device presents far fewer management difficulties and provides the benefits of single adjudication, economy of scale, and comprehensive

supervision by a single court on the issue of Defendants' liability. Class treatment of the liability issues will ensure that all claims and claimants are before this Court for consistent adjudication of the liability issues.

FIRST CAUSE OF ACTION
(California False Advertising Law –
Cal. Bus. & Prof. Code § 17500, *et seq*.
on behalf of the Class and the California State Subclass)

92.   Plaintiff repeats the allegations contained in the above paragraphs as if fully set forth herein.

93.   Defendants engaged in unlawful conduct under California Business & Professions Code § 17500, *et seq*., by marketing MAX LS Products as possessing properties they do not have. More specifically, and as set forth above, Defendants misrepresented that the MAX LS Products can, among other things, "help reduce the signs of aging";[46] "immediately reduce the appearance of lines and wrinkles";[47] "promote[] a noticeably more lifted, firmer and resilient look";[48] "dramatically de-puff[] and reduce[] the look of dark circles";[49] "help[] skin look younger, longer"[50] or provide any of the other promised age-negating results as described herein. Plaintiff and the Class reasonably relied upon Defendants' material representations and/or omissions made in violation of California Business & Professions Code § 17500, *et seq*.

94.   Defendants also failed to disclose material facts regarding the efficacy of the MAX LS Products and the purported supporting scientific references and clinical tests as described herein.

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[46] *See* MAX LS Product inserts.
[47] *Id*.
[48] *Id*.
[49] *Id*.
[50] *See* MAX LS Product line.

95.   Defendants' misrepresentations and omissions constitute an unconscionable commercial practice, deception, fraud, false pretense, and/or misrepresentation of material facts.

96.   As a direct and proximate result of Defendants' violations, Plaintiff the Class and California State Subclass suffered an ascertainable loss directly, foreseeably, and proximately caused by Defendants' misrepresentation and/or omissions because they were induced to purchase and/or paid a price premium due to the advertising, marketing, packaging, labeling, and other promotion of MAX LS Products. Because of Defendants' misrepresentations and/or omissions, Plaintiff and the other members of the Class and Subclass did not receive the benefits they believed they had purchased.

97.   Plaintiff is informed and believes that as a further direct and proximate result of the marketing described above, Defendants have received from members of the Class and Subclass money obtained through their violation of California Business & Professions Code § 17500, *et seq*., which Defendants continue to hold for their sole benefit.

98.   Accordingly, Plaintiff on behalf of himself and all others similarly situated, seeks equitable relief in the form of an order requiring Defendants to refund to Plaintiff, and members of the Class and Subclass all monies they paid for MAX LS Products and an order requiring Defendants to cease representing that MAX LS Products possess anti-aging benefits above and beyond that or an ordinary moisturizing cream.

SECOND CAUSE OF ACTION
(California Unfair Competition Law –
Cal. Bus. & Prof. Code§ 17200, *et seq*.
on behalf of the Class and California State Subclass)

99.   Plaintiff repeats the allegations contained in the above paragraphs as if fully set forth herein.

100.   Defendants engaged in unlawful conduct under California Business & Professions Code § 17200, *et seq.*, by marketing MAX LS Products as possessing properties they do not have. More specifically, and as set forth above, Defendants misrepresented that the MAX LS Products can, among other things, "help reduce the signs of aging"; [51] "immediately reduce the appearance of lines and wrinkles"; [52] "promote[] a noticeably more lifted, firmer and resilient look"; [53] "dramatically de-puff[] and reduce[] the look of dark circles"; [54] "help[] skin look younger, longer"[55] or provide any of the other promised age-negating results as described herein. Plaintiff and the Class reasonably relied upon Defendants' material representations and/or omissions.

101.   Defendants' conduct is unlawful in that it violates the False Advertising Law, California Business & Professions Code § 17500, *et seq.*

102.   Defendants' misrepresentations and omissions constitute an unconscionable commercial practice, deception, fraud, false pretense, and/or misrepresentation of material facts. The harm arising from Defendants' conduct outweighs any legitimate benefit Defendants have derived from the conduct.

103.   The facts not disclosed by Defendants to Plaintiff are material in that a reasonable consumer would have considered them important in deciding whether to purchase MAX LS. Had Plaintiff and members of the Class and Subclass known MAX LS is no more effective than an ordinary moisturizer, they would not have purchased MAX LS or would have paid considerably less for their purchase.

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[51] *See* MAX LS Product inserts.
[52] *Id.*
[53] *Id.*
[54] *Id.*
[55] *See* MAX LS Product line.

104.   Defendants' misrepresentations and omissions are likely to mislead a reasonable consumer.

105.   Plaintiff relied on Defendants' misrepresentations and omissions.

106.   Plaintiff, on behalf of himself, members of the Class, and Subclass, seeks reimbursement of monies they paid for MAX LS. Additionally, Plaintiff seeks equitable and injunctive relief on behalf of himself and the Class Members pursuant to Cal. Business & Professions Code § 17203.

THIRD CAUSE OF ACTION
(Violation of California Consumer Legal Remedies Act,
California Civil Code § 1750, *et seq*.
on behalf of the Class and Subclass, seeking injunctive relief only)

107.   Plaintiff repeats the allegations contained in the above paragraphs as if fully set forth herein.

108.   Plaintiff brings this cause of action on behalf of himself and on behalf of all other members of the Class and Subclass.

109.   Plaintiff is seeking only injunctive relief.

110.   Defendants are "persons" as defined by California Civil Code § 1761(c).

111.   Plaintiff and members of the Class and Subclass are "consumers" within the meaning of California Civil Code § 1761(d).

112.   Defendants' marketing of MAX LS Products as possessing properties they do not have. More specifically, and as set forth above, Defendants misrepresented that the MAX LS Products can, among other things, "help reduce the signs of aging";[56] "immediately reduce the appearance of lines and wrinkles";[57] "promote[] a noticeably more lifted, firmer and

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[56] *See* MAX LS Product inserts.
[57] *Id*.

resilient look"; [58] "dramatically de-puff[] and reduce[] the look of dark circles"; [59] "help[] skin look younger, longer" [60] or provide any of the other promised age-negating results as described herein.

113.   Defendants violated and continue to violate the Act by engaging in the following practices proscribed by California Civil Code §1770(a) in transactions with Plaintiff and the Class which were intended to result in, and did result in, the sale of the MAX LS Products:

> (5)   Representing that [the Products] have . . . approval, characteristics, . . . uses [and] benefits . . . which [they do] not have . . . .

<div align="center">*   *   *</div>

> (7)   Representing that [the Products] are of a particular standard, quality or grade . . . if [they are] of another.

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> (9) Advertising goods . . . with intent not to sell them as advertised.

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> (16)   Representing that [the Products have] been supplied in accordance with a previous representation when [they have] not.

114.   Defendants' unfair and deceptive acts occurred repeatedly and were capable of deceiving a substantial portion of the purchasing public.

115.   The facts not disclosed by Defendants to Plaintiff are material in that a reasonable consumer would have considered them important in deciding whether or not to purchase MAX LS or to pay less for that product. Had Plaintiff and members of the Class and Subclass known MAX LS products are

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[58] *Id.*

[59] *Id.*

[60] *See* MAX LS Product line.

no more effective than ordinary moisturizing creams, they would not have purchased MAX LS Products or would have paid considerably less for their purchase.

116.   Defendants' misrepresentations and omissions are likely to mislead a reasonable consumer.

117.   Plaintiff relied on Defendants' misrepresentations and omissions.

118.   As a direct and proximate result of Defendants' unfair or deceptive acts or practices, Plaintiff and members of the Class and Subclass have suffered and will continue to suffer actual damages.

119.   Also, pursuant to §1782 of the Act, Plaintiffs notified Defendants in writing by certified mail of the particular violations of §1770 of the Act and demanded that they rectify the problems associated with the actions detailed above and give notice to all affected consumers of their intent to so act.

120.   Copies of the letters are attached hereto as Exhibit 11.

121.   If Defendants fail to rectify or agree to rectify the problems associated with the actions detailed above and give notice to all affected consumers within 30 days of the date of written notice pursuant to §1782 of the Act, Plaintiffs will amend this complaint to add claims for actual, punitive and statutory damages, as appropriate.

122.   Defendants' conduct is fraudulent, wanton, and malicious.

123.   Pursuant to §1780(d) of the Act, attached hereto is the affidavit showing that this action has been commenced in the proper forum.

124.   Plaintiff and members of the Class and Subclass care entitled to injunctive relief. Accordingly, Plaintiff seeks an Order enjoining Defendants from engaging in the deceptive practices alleged herein.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff, on behalf of himself and the Class and California Subclass requests the following relief:

    A. An order that this action may be maintained as a Class Action under Rule 23 of the Federal Rules of Civil Procedure, that Plaintiff be appointed Class representative for the Class and Subclass and that Plaintiff's counsel be appointed as counsel for the Class and Subclass;

    B. A permanent injunction against Defendants, restraining, preventing and enjoining Defendants from engaging in the illegal practices alleged;

    C. An order requiring Defendants to disgorge the profits wrongfully obtained through the use of their illegal practices;

    D. Actual damages;

    E. An award of attorneys' fees;

    F. An award of the costs of suit reasonably incurred by Plaintiff and his counsel;

    G. An award of interest, including prejudgment interest, at the legal rate, and;

    H. Such other and further relief as the Court deems necessary and appropriate.

DATED: April 28, 2014   Respectfully submitted,

By: *Todd D. Carpenter*_____

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Counsel for Plaintiff and the Proposed Class

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<u>DEMAND FOR JURY TRIAL</u>

8   PLAINTIFF, ON BEHALF OF HIMSELF AND ALL OTHERS

9 SIMILARLY SITUATED, HEREBY DEMANDS A TRIAL BY JURY OF

10 ALL CLAIMS SO TRIABLE IN THE ABOVE REFERENCED MATTER.

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12 DATED: April 28, 2014   Respectfully submitted,

13

14   By: *Todd D. Carpenter*

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Exhibit 1

Pricing strategy and practice

Do high prices signal high quality? A theoretical model and empirical results

Jukti K. Kalita

Sharan Jagpal and

Donald R. Lehmann

The authors

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Abstract

This paper has three objectives. First, we develop an equilibrium pricing model in which consumers have incomplete information about both product qualities and prices. Specifically, manufacturers can use high prices to signal high quality to uninformed consumers. Furthermore, prices of any given brand can vary geographically across retail outlets. We show that previous models are special cases of our model. Specifically, the hedonic regression model assumes that consumers have full information about all product qualities and prices. Second, we propose a methodology for testing price-signaling models. Third, we test our model using data from consumer reports for several consumer durable and nondurable products. The results show that firms use prices to signal quality, regardless of whether they market durable or nondurable products. The results do not support the popular theory that markets for experience goods are more efficient than those for search goods. Finally, our model outperforms the standard hedonic regression model for four of the five product categories analyzed.

Electronic access

1. Introduction

Standard pricing models are incomplete. As discussed in detail in section 2, the popular hedonic pricing model implicitly assumes that consumers are fully informed about all product qualities and prices. In contrast, geographical price dispersion models assume that consumers are fully informed about product qualities but have incomplete information about the prices of a given brand across distribution outlets. Price-signaling models, on the other hand, assume that consumers have incomplete information about product qualities. Thus, manufacturers can use high prices to signal high quality to uninformed consumers. However, price-signaling models unrealistically assume that manufacturers sell directly to consumers (equivalently, the geographical dispersion of prices across stores for a given brand is zero). In practice, many manufacturers use intermediaries (e.g. retailers) to sell their products. And, as casual empiricism shows, prices for any given brand vary across retail outlets.

This paper has three objectives. First, we extend the standard price-signaling model to allow for a two-level distribution channel in which manufacturers sell to retailers who, in turn, sell products to consumers. Consumers have imperfect information about both product quality and retail prices for any given brand. Second, we develop an empirical methodology for testing price-signaling models. To our knowledge, price-signaling models have not been empirically tested before. Third, we test our model using data from consumer reports.

The empirical results strongly support our theory. Specifically, firms use price signals to appeal to uninformed consumers, regardless of whether they market durables or nondurables. Contrary to popular theory, the markets for experience goods (e.g. paper towels) are more inefficient than the markets for search goods (e.g. VCRs). Finally, for four of the five product categories analyzed, our model outperforms the hedonic pricing model.

2. Review of previous pricing theories

This section reviews the theoretical foundations of the popular hedonic pricing model, search cost models, and price-signaling models.

The hedonic pricing model

Consider a perfectly competitive market in which all consumers and producers are fully informed about product qualities and prices and firms can enter or exit the market without cost. Then two brands with identical combinations of attributes/

product features must charge identical prices. Rosen (1974) characterizes this type of pricing equilibrium.

Let p_i denote the price of the ith brand in a given product category and $(x_{1i}, \ldots, x_{ni})$ denote the levels of the objective attributes provided by the brand, where the attributes can be discrete, continuous, or a combination of both. Then Rosen shows that, in equilibrium:

$$p_i = f(x_{1i}, \ldots, x_{ni}) \qquad (1)$$

where f is nonlinear. Equation (1) provides the theoretical foundation for the standard hedonic regression pricing model.

Rosen's model (equation (1)) is incomplete because it implicitly assumes that the manufacturer does not use intermediaries (e.g. retailers) to sell its product to consumers. More importantly, the hedonic pricing model unrealistically assumes that all consumers are fully informed about product quality and prices.

Search cost models

It is well known that prices for a given brand vary geographically across stores even if the market is competitive (Stigler, 1961). Suppose that consumers are fully informed about product quality but are not fully informed about the prices of different brands across retail outlets. Pratt *et al.* (1979) develop a search model where consumers know the subjective probability distribution of prices in the market but do not know the price a particular retailer charges for any given brand. The Pratt *et al.* model postulates that consumers search sequentially across stores to discover the lowest price for a given brand, possibly updating their beliefs about prices, using Bayes' rule. At any point, consumers can choose to quit the market, make a purchase from the set of sampled brands, or continue searching. Consumers stop searching when the expected benefit from incremental search (i.e. a price reduction) equals the expected cost of additional search. Under these conditions there is a unique price-quality equilibrium in the market. Let j index retail stores. Then:

$$p_{ij} = f(x_{1i}, \ldots, x_{ni}) + s_{ij} \qquad (2)$$

where the store effect s_{ij} captures the geographical price dispersion in the market.

Note that f represents the "average" retail price of brand i in a market where consumers are fully informed about quality but price information is costly. Furthermore, s_{ij} is not stochastic: it simply describes the equilibrium price dispersion across stores. Interestingly, equation (2) can also be derived from several other search models where consumers are uncertain about sellers' prices but

not about product quality (see Butters, 1977; Salop and Stiglitz, 1977; Braverman, 1980).

In sum, extant search cost models can explain the geographical dispersion of prices in a two-tier distribution structure where firms sell to retailers who, in turn, sell to consumers. However, these search models assume, unrealistically, that all consumers are fully informed about the qualities offered by different brands.

Price-signaling models

As discussed above, the hedonic pricing and search cost models assume that all consumers are fully informed about product quality. Suppose more realistically that some consumers are informed about product attributes and others are uninformed. Consider the extreme case where all consumers are uninformed. Then the market will "fail" because only low-quality producers will offer their products on the market (Akerlof, 1970).

In reality, some, but not all, consumers are uninformed about quality. In such cases, in contrast to the competitive model, price can play an informational role. Specifically, firms can attempt to appeal to uninformed consumers by using high prices as a signal of high quality. Thus, firms that signal will gain sales from the segment of uninformed consumers which believes the signal. They will also lose sales from informed consumers who go elsewhere. The interesting question is to determine if an equilibrium exists in such a market and, if so, to characterize it.

The economics literature has examined this problem in detail, assuming that the manufacturer sells directly to consumers. Wolinsky (1983) develops a search model where some, but not all, consumers are uninformed about quality. The Wolinsky model allows for a wide range of consumer information-processing strategies. For example, uninformed consumers can form judgments in "attribute space" and simply perceive the objective attributes with error. Alternatively, they can idiosyncratically map the physical attributes to a set of unobservable perceptual dimensions (e.g. benefits) with error. Thus, the model allows for errors in perception and judgment that can vary across consumers.

In Wolinsky's model, consumers buy directly from the firm. Their search strategy is as follows. First choose a price level. Then search randomly among brands with this price level and compare marginal benefits and costs. Depending on the signal obtained (this depends on the objective attributes and the biases in consumer information-processing), consumers update their perceptions, decide to buy one of the brands examined, quit the market, or continue sampling brands.

As Wolinsky shows, prices can serve as signals that exactly differentiate the available quality levels. Each price signal exceeds the marginal cost of producing the quality it signals. The exact markup depends on the proportion of uninformed consumers in the market and on the nature of the product-specific information received by consumers. The poorer the information, the higher the markup (Wolinsky, 1983; Proposition 2). Importantly, these results hold for search goods (e.g. consumer durables) and for experience goods where consumers make repeat purchases and update their information through experience.

Given the scenario described, Wolinsky (1983, Proposition 1) shows that there is a "separating equilibrium" where prices are given by:

$$p_i = f(x_{1i}, \ldots, x_{ni}) + u_i \qquad (3)$$

where f denotes the full-information competitive price and $u_i \geq 0$.

This model captures a key aspect of reality: some consumers are uninformed about product quality. Specifically, the model allows for general types of consumer behavior (i.e. heterogeneous perceptions and/or heterogeneous preferences), revisions of beliefs (i.e. learning), and free entry and exit by firms. Interestingly, it is possible to arrive at Wolinsky's price-signaling model (equation (3)) using different sets of assumptions about the behaviors of consumers and firms (see Bagwell and Riordan, 1991; Milgrom and Roberts, 1986; Klein and Leffler, 1981; Shapiro, 1983; Allen, 1984). Importantly, these price-signaling models assume that manufacturers sell directly to consumers. This assumption is unrealistic because manufacturers often use intermediaries (e.g. retailers) to sell their products.

In summary, previous pricing models are incomplete in some aspects. The hedonic pricing model implicitly assumes that consumers are fully informed about product quality and prices. Standard search models assume that consumers are fully informed about quality but are uninformed about prices in the distribution channel. Standard price-signaling models assume that some consumers are uninformed about product quality. However, they implicitly assume that the manufacturer sells directly to the consumer. Here we examine a more general model in which consumers have incomplete information about both product quality and prices. In particular, the model allows for a distribution structure in which the manufacturer uses channel intermediaries (e.g. retailers) to sell to consumers (end-users).

3. A multichannel pricing model

In this section, we develop an equilibrium pricing model in which consumers have incomplete information about both product quality and prices and buy products from intermediaries (e.g. retailers). Suppose the manufacturer uses a two-level distribution channel. For example, manufacturers sell to retailers who, in turn, sell to consumers. The problem is to develop an equilibrium model in which consumers have incomplete product information and incomplete price information across stores.

Consider the following three-stage game. In the first stage, each manufacturer sets a price (e.g. the "list" price) for its brand. In the second stage, consumers decide which brand to purchase. Recall that retail stores are free to set their own prices for each brand. Thus, the retail price for a given brand at any given retail outlet need not coincide with the corresponding list price set by the manufacturer. In the third stage, consumers search among retail outlets and choose which store to purchase from.

Let $\mathcal{J}$ denote the number of retailers in the marketplace. For any retailer j, let the difference between the list price for a given brand and the store price for that brand be s_{ij} where s_{ij} denotes the store effect. Then, the equilibrium structure of prices across brands and stores is given by:

$$p_{ij} = f(x_{1i}, \ldots, x_{ni}) + u_i + s_{ij} + w_i \qquad (4)$$

where p_{ij} denotes the price of brand i in store j, s_{ij} denotes the store effect for brand j, and w_i is a stochastic disturbance term such that $E(w_i) = 0$. Note that equation (4) reduces to the standard one channel price-signaling model (equation (3)) when the manufacturer sells directly to the consumer (all store effects are equal to zero). Furthermore, equation (4) reduces to the standard geographical price dispersion model (equation (2)) when consumers are fully informed about product quality and manufacturers do not use price as a signal (the u_is are zeros).

To test the theory empirically, we proceed as follows. Suppose we collect price data on different brands using a random sample of stores. Let $\bar{p}_i$ denote the mean price of brand i across stores in the sample and let $E(s_{ij}) = \alpha$. Then equation (4) becomes:

$$\bar{p}_i = f(x_{1i}, \ldots, x_{ni}) + \alpha + u_i + v_i \qquad (5)$$

where v_i denotes the new disturbance term capturing w_i and price variance across stores.

The theory can now be tested in a straightforward manner. See the Appendix for details. Estimate equation (5) with the u_is and v_is free (i.e. unconstrained) and with the u_is set

identically to zeroes (i.e. constrained). If the unconstrained model fits the data better than the constrained model, the price signaling hypothesis is supported (i.e. at least one u_i is positive).

Suppose the price-signaling hypothesis is supported for any given product category. Then the estimates $\hat{u}_i \geq 0$ measures the price signals for brand i. To measure the strength of brand i's price signal it is necessary to rescale the u_is. Thus, a price signal of $1 for a brand whose average price is $20 is much weaker than a price signal for a brand whose average price is $10. We therefore use the quantity $\hat{u}_i/\bar{p}_i$ to measure the strength of brand i's price signal[1].

Before testing our model, we review the existing empirical literature on hedonic pricing, search models, and price dispersion.

4. Previous empirical studies

This section reviews previous empirical methodologies that examine market efficiency and price dispersion in the marketplace.

Hedonic pricing models

Numerous empirical studies in economics and marketing have estimated hedonic regression pricing models. However, as discussed, the hedonic pricing model implicitly assumes that all consumers are fully informed about product qualities and prices. Consequently, the hedonic pricing model cannot to be used to test if markets are inefficient (the focus of our research). The hedonic pricing model is a special case of our model where the u_is are zeros in equations (4) or (5).

Price dispersion studies

Pratt et al. (1979) estimate the degree of retail price dispersion for a particular brand. However, their model assumes that consumers are fully informed about product quality but have incomplete information about prices. This model is a special case of our model (equation (4)) in which all signaling effects are identically zeroes.

Empirical studies on market efficiency

Several authors argue that markets are inefficient to the extent that some measure of price dispersion is "large" (Oxenfeldt, 1950; Mayne and Assum, 1982; Geistfeld et al., 1986). This approach can be seriously misleading because it measures price dispersion without controlling for the different levels of attributes provided by competing brands. Other authors measure market efficiency in terms of the Spearman rank-correlation between price

and an ordinal measure of quality (Morris and Bronson, 1969; Riesz, 1979; Geistfeld, 1982; Curry and Faulds, 1986; Sproles, 1986; Curry and Riesz, 1988). This approach assumes unrealistically that the researcher can correctly rank f (i.e. the full-information price) across all brands and that $u_i \equiv 0$. In addition, it does not account for the equilibrium distribution of prices across stores. Hence weak measured price-quality relationships found in these studies do not necessarily imply that product markets are inefficient.

Hjorth-Andersen (1984) treats quality as a multidimensional construct and uses a simple dominance criterion to determine market efficiency. Specifically, brand i is inefficient if some other brand in the product category is cheaper but provides a higher or an equal level of all the salient attributes than brand i. This method is in the spirit of equation (3). However, the method does not recognize that the price of a brand varies across retail outlets. In addition, the method does not provide a measure of the degree of market inefficiency for each brand in the product category.

Kamakura et al. (1988) use a linear programming-based method called data envelopment analysis, or DEA, to measure the degree of product market inefficiency (see Charnes et al., 1983). This method is also similar to equation (3). However, in contrast to the Hjorth-Anderson approach, it provides estimates of market inefficiency, u_i. Specifically, DEA estimates separate functions f for each brand using a piecewise linear approximation. Consequently, DEA allows a high degree of flexibility in fitting the data. However, the DEA method has several limitations. DEA fits different functions for all brands. This is problematic because equilibrium theory requires that the function f is common across brands. DEA also uses a technical measure of efficiency that implicitly assumes that perceptions are homogeneous (Kamakura et al., 1988, p. 293). Furthermore, DEA does not recognize that there is a geographical dispersion of prices across stores and that the measured price is a random variable. In addition, DEA does not allow for omitted variables.

In summary, previous empirical methods are special cases of our model. Thus, the hedonic regression model cannot be used to test for market efficiency because it assumes that consumers are fully informed about both product quality and prices. Pratt et al. allow for limited market inefficiency because they assume that consumers are fully informed about product quality but have incomplete price information. Other empirical methods (e.g. DEA) cannot be derived from an equilibrium theory of prices. In contrast, our

empirical method (see equation (5)) is based on an equilibrium theory. Furthermore, our model allows consumers to have incomplete information about both product quality and prices.

5. Empirical results

Data

Many previous studies of the price-quality relationship use data published in consumer reports (see Oxenfeldt, 1950; Riesz, 1979; Hjorth-Andersen, 1984; Kamakura *et al.*, 1988; Curry and Riesz, 1988). We follow this tradition and analyze data for several industries: VCRs, toasters, toilet paper, paper towels, and laundry detergents and fabric softeners (Consumer Union, 2003).

As shown in Rosen (1974), the equilibrium price-quality equation is inherently nonlinear even in a simple model in which consumers are fully informed about both product quality and prices. We therefore use logarithms of all continuous variables that were measured on a ratio scale. Categorical variables are treated as dummy variables. Interval-scaled variables (e.g. the "picture quality" of a VCR which is rated on a five-point scale) are incorporated linearly because it is theoretically improper to take logarithms of such variables.

Since we use cross-sectional data, it is important to test for heteroscedasticity (see Appendix for details). In all cases, the hypothesis of homoscedasticity could not be rejected[2]. Thus, we can compare the results for equation (5) for both the constrained and unconstrained models using the data reported by Consumer Union (2003).

VCRs

Data on eight attributes for 36 brands were used. The attributes are:
(1) Picture quality.
(2) Programming ability.
(3) Pause control.
(4) Tape flutter.
(5) Capability of extra-long recording of very high quality up to 24 hours.
(6) Number of heads.
(7) Number of channels.
(8) Format.

Attributes (1) through (4) were measured on rating scales ranging from 1 (poor) to 5 (excellent). Attributes (5) and (8) were measured as dichotomous variables.

Applying the likelihood ratio test, we find that the chi-squared statistic is 0.94, which is not significant for two degrees of freedom (see

Table I). Hence the VCR market is efficient: VCR manufacturers do not use prices to signal product quality.

Toasters

Data on four attributes for 25 brands were used. The attributes are:
(1) Overall toasting performance (measured on a five-point scale).
(2) A dummy variable indicating if the toaster is a four-slice toaster or not.
(3) A dummy variable indicating if the unit is a square side-by-side unit or not.
(4) A dummy variable indicating if the unit automatically adjusts the width of the slots or not.

The empirical results are shown in Table II. Applying the likelihood ratio test, we find that the chi-squared statistic is 6.54 which is significant for two degrees of freedom ($p < 0.05$). Hence firms in the toaster market use high prices to signal high quality.

In order to measure the intensity of price signaling, we computed the average strength of the price signals across brands. This value is 20.4 percent. That is, on average, toasters are priced 20.4 percent higher than they would have been in a competitive equilibrium. Hence, the toaster market is inefficient. In contrast to the VCR market, toaster manufacturers use high prices to signal high quality.

Toilet paper

We analyzed 37 brands using four attributes:
(1) Softness.
(2) Absorbency.
(3) Wet strength.
(4) Durability.

All attributes are measured on five-point interval scales, where 5 means "excellent" and 1 means "poor". To correct for package size differences, we measured price (in cents) per roll in the package.

The chi-squared statistic for the likelihood ratio test is 5.2 which is significant for two degrees of freedom ($p < 0.10$). The average strength of the price signal across brands is 19.8 percent. Hence, on average, firms in the toilet paper industry "overprice" by 19.8 percent in order to appeal to the uninformed consumer segment. This result contradicts the popular view that markets for experience goods are efficient (Nelson, 1974) (Table III).

Paper towels

Data on five attributes for 27 brands were used. The attributes are:
(1) Absorption capacity.

Table I Parameters of the hedonic regression and signaling models: VCRs

	Hedonic regression	t-value	Signaling model	t-value
Intercept	−28.40	−4.21	−29.39	−4.70
Picture quality	0.36	1.28	0.36	0.88
Programming capability	0.25	0.93	0.25	0.69
Pause control	0.23	1.08	0.22	0.78
Tape flutter	0.45	1.23	0.45	1.17
Extra-long recording capability	5.51	4.09	5.52	3.81
Number of heads	0.75	2.52	0.75	2.79
Number of channels	5.29	3.85	1.55	4.23
Format (VHS or beta)	1.55	1.84	0.84	1.83
	adj R-sq = 0.86		s.d. of u = 1.22	
			s.d. of v = 0.075	
Log-likelihood	−52.86		−52.39	

Note: The average signal strength across brands was not computed because the likelihood ratio test was not statistically significant

Table II Parameters of the hedonic regression and signaling models: toasters

	Hedonic regression	t-value	Signaling model	t-value
Intercept	−4.16	−4.41	−3.21	−6.19
Overall toasting performance	2.17	7.49	1.59	9.71
Four-slice toaster	0.65	2.03	1.17	2.43
Square side-by-side unit	1.66	4.05	1.71	3.76
Automatically adjusts width of slots	6.48	7.23	5.99	0.83
	adj R-sq = 0.82		s.d. of u = 0.94	
			s.d. of v = 0.03	
Log-likelihood	−20.30		−17.03	
			Average signal strength = 20.4%	

Table III Parameters of the hedonic regression and signaling models: toilet paper

	Hedonic regression	t-value	Signaling model	t-value
Intercept	0.025	2.59	0.012	0.87
Softness	0.00635	3.00	0.00558	2.312
Absorbency	0.00254	0.99	0.00212	0.831
Wet strength	−0.00158	−0.57	0.00798	0.251
Durability	0.00432	0.00	0.00357	1.103
	adj R-sq = 0.32		s.d. of u = 0.016	
			s.d. of v = 0.005	
Log-likelihood	−111.73		−114.33	
			Average signal strength = 19.0%	

(2) Wet strength.

(3) Absorption rate in water.

(4) Absorption rate in oil.

(5) Linting.

All attributes are measured on five-point scales. The results are reported in Table IV. The chi-squared statistic is 8.66 that is significant for two degrees of freedom ($p < 0.05$) and the average strength of the price signal is 20.1 percent. Hence the results strongly support the price-signaling hypothesis.

Laundry detergents and fabric softeners

Data on six attributes were used:

(1) Anti-deposition on polyester.

(2) Anti-deposition on nylon.

(3) Whitening ability on polyester.

(4) Whitening ability on nylon.

(5) If a fabric softener (dummy variable).

(6) If a liquid (dummy variable).

The log-likelihood statistic is 20.60 which is highly significant for two degrees of freedom ($p < 0.001$) (see Table V). Furthermore, the average signal strength is 25.0 percent. Hence the laundry

Table IV Parameters of the hedonic regression and signaling models: paper towels

	Hedonic regression	t-value	Signaling model	t-value
Intercept	−0.39	−1.40	−0.07	−0.20
Absorption capacity	0.17	2.27	0.07	0.81
Wet strength	0.08	2.12	0.05	1.39
Absorption rate in water	−0.01	−0.22	−0.02	−0.25
Absorption rate in oil	0.07	1.43	0.07	2.04
Linting	0.06	0.98	0.04	0.32
	adj *R*-sq = 0.69		s.d. of u = 0.25	
			s.d. of v = 0.03	
Log-likelihood	−13.05		−17.38	
			Average signal strength = 20.1%	

Table V Parameters of the hedonic regression and signaling models: laundry detergents and fabric softeners

	Hedonic regression	t-value	Signaling model	t-value
Intercept	−0.21	−0.19	−0.64	−0.66
Anti-deposition on polyester	0.21	1.58	0.09	0.41
Anti-deposition on nylon	−0.45	−0.02	0.12	0.66
Whitening ability on polyester	0.29	3.03	0.25	2.17
Whitening ability on nylon	−0.17	−1.67	−0.20	−1.19
Fabric softener (dummy variable)	0.93	3.32	0.93	3.17
Liquid (dummy variable)	0.60	2.39	0.60	1.66
	adj *R*-sq = 0.26		s.d. of u = 0.72	
			s.d. of v = 0.01	
Log-likelihood	−26.95		−16.65	
			Average signal strength = 25.0%	

detergent and fabric softener industry is somewhat more inefficient than the paper towel industry.

To summarize, the results suggest that the markets for big-ticket durables (e.g. VCRs) are efficient. Consequently, manufacturers do not use high prices to signal high quality. In contrast, the markets for cheaper durables (e.g. toasters) are inefficient and manufacturers use high prices to signal quality. These findings are not surprising. The benefit-cost ratio to consumers from search for better quality or lower prices are higher for VCRs (a big-ticket item) than the corresponding ratio for toasters (a cheaper item). Hence the pool of uninformed consumers for VCRs is smaller than the corresponding pool for toasters. The results consistently show that markets for nondurables are inefficient. Thus, firms use price signals in nondurable markets to appeal to uninformed consumers. This occurs for two reasons. First, the benefit-cost ratio to consumers from search is low for nondurables. Hence the pool of uninformed consumers is large. Furthermore, the benefits from product attributes are often subjective (i.e. consumer perceptions are heterogeneous). Hence price

signaling is an efficient marketing instrument for the manufacturer selling nondurables.

6. Conclusion

This paper develops and tests an equilibrium pricing model in which consumers have incomplete information about both product quality and prices. Our model includes conventional models (e.g. the hedonic pricing model and standard geographical price dispersion models) as special cases. We propose and test a new empirical methodology for measuring equilibrium prices in markets that are inefficient. The results strongly suggest that firms use high prices to signal high quality, regardless of whether they sell durables or nondurables. Contrary to popular theory, the markets for experience goods appear to be more inefficient than the markets for search goods. In most cases our model explains prices better than the hedonic regression model (a special case of our model).

Several areas remain for future research. Our empirical study was based on cross-sectional data. Future studies should examine how the

distribution of the price signals changes over the product life cycle (see Bagwell and Riordan, 1991). These results should be of interest to the marketing manager and public policy-makers alike. In addition, our model assumes that price is the only signal that the manufacturer can use. Future research should extend the model to the case where the manufacturer can simultaneously use multiple marketing instruments such as price and advertising to signal quality to uninformed consumers in the marketplace (see Milgrom and Roberts, 1986; Engers, 1987).

Notes

1 This measure of signal strength is reasonable if we examine brands of the same type (e.g. national brands). Note that equation (5) uses average store prices because published sources (e.g. Consumer Union, 2003) do not provide raw store-level price data. Thus, equation (5) cannot be used to estimate the geographical dispersion of store prices for different brands.

2 We performed the White (1980) test on the estimated residuals ($\hat{v}_i$'s). See appendix for details. The results show that the hypothesis of homoscedasticity cannot be rejected for any of the five product categories examined. The chi-squared values are: 33.2 with 33 df and $p > 0.45$ for VCRs, 9.8 with 7 df and $p > 0.20$ for toasters, 10.1 with 10 df and $p > 0.76$ for toilet paper, 25.5 with 20 df and $p > 0.18$ for paper towels, and 18.8 with 25 df and $p > 0.81$ for fabric softeners and detergents.

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Appendix. Estimating the multichannel pricing model

Following is an outline of the maximum likelihood procedure for estimating equation (5) using cross-sectional data such as those provided by Consumer Union (2003). Our approach parallels Schmidt (1976).

Let $\bar{p}_i$ denote the mean price of brand i in the sample and $x_i = (x_{1i}, \ldots, x_{ni})$ the n-dimensional vector of salient attributes where the attributes can be discrete or continuous. Then the price-quality equilibrium relationship is given by:

$$\bar{p}_i = f(x_i) + \alpha + u_i + v_i \qquad (A1)$$

where $u_i \geq 0$, $v_i = (\bar{s}_i - \alpha) + w_i$, where $\bar{s}_i$ denotes the mean store effect in the sample and $E(v_i) = 0$. Recall that price signaling theory will be supported if and only if the unconstrained model ($u_i \geq 0$) fits better than the constrained model ($u_i \equiv 0$).

For expository convenience, assume that $f(x_i)$ is linear in the variables. That is, consider:

$$\bar{p}_i = a_0 + a_1 x_{1i} + \ldots\ldots\ldots + a_n x_{ni} + u_i + v_i \qquad (A2)$$

where the as denote parameters. As in standard regression models, the methodology can be used if f is nonlinear in its arguments provided these effects are linearly separable.

Assume as in standard regression models that $\text{Cov}(u_i, v_i) = 0$ for all i, $\text{Cov}(x_{ji}, u_i) = 0$ for all i and j, and $\text{Cov}(x_{ji}, v_i) = 0$ for all i and j. Let u_i have a half-normal distribution such that $u_i \geq 0$, and v_i be normally distributed. Let $\in = u + v$. In order to form the likelihood function, it is necessary to obtain the density function of the composite error term $\in$ (Figure A1).

We proceed using the convolution approach. The density function for the sum of a normal and a half-normal distribution is (Aigner *et al.*, 1964):

$$h(\varepsilon) = \frac{[2f(\frac{t}{\sigma})F(t\frac{\lambda}{\sigma})]}{\sigma} \qquad (A3)$$

where

$$\sigma_2 = \sigma_u^2 + \sigma_v^2, \lambda = \frac{\sigma_u}{\sigma_v},$$

f denotes the density function of a normally distributed random variable, and F denotes the appropriate distribution function.

Then the log-likelihood function to be maximized is:

$$\ln(\bar{p}/a, \lambda, \sigma^2) = I\ln\sqrt{\left(\frac{2}{\pi}\right)} + \sum_{i=1}^{I} F\left(\varepsilon_i \frac{\lambda}{\sigma}\right)$$
$$+ I\ln\frac{1}{\sigma} - \sum_{i=1}^{I} \frac{\varepsilon_i^2}{2\sigma^2} \qquad (A4)$$

where $\bar{p}$ denotes the vector of sample mean prices and I denotes the number of brands.

This maximization problem can be solved using a variety of iterative algorithms (see Aigner *et al.*, 1977). Once the maximum likelihood parameter estimates are obtained, it is straightforward to compute the covariance matrix for the parameters using the appropriate information matrix. All the usual maximum likelihood properties apply (i.e. the estimates are consistent and asymptotically efficient).

Let $L^\star$ denote the solution that maximizes equation (A4). Let $L^{\star\star}$ denote the solution that maximizes equation (A4) subject to the constraints $u_i \equiv 0$.

Suppose the error terms (v_is) are homoscedastic (we will discuss tests and empirical procedures for heteroscedasticity later). Then, it is straightforward to use the likelihood ratio test to determine if price is a signal of quality (Maddala, 1977, p. 44). Let $Q = -2(L^{\star\star} - L^\star)$. For large samples, Q has a chi-squared distribution with two degrees of freedom because the full model requires two additional parameters. Thus, the price-signaling hypothesis is supported if Q is statistically significant.

Suppose the price-signaling theory is supported. In order to determine the strength of the price signal, we need to estimate u_i for each brand. To obtain a point estimate of u_i, we use the mean of the conditional distribution of u_i given $\in_i$. This estimate is given by:

Figure A1 Normal versus half-normal distribution
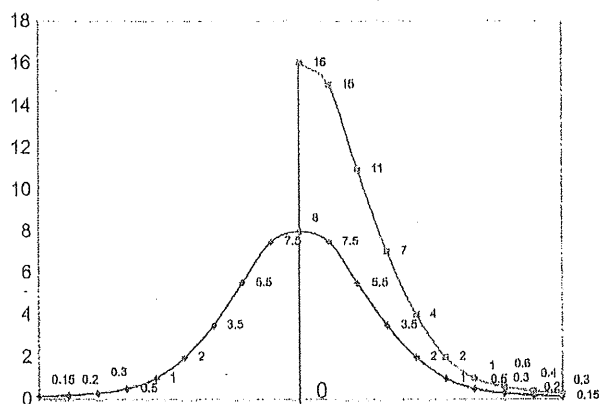
Note: The normal distribution is symmetrical while the half-normal distribution has no representation on the negative side of the number line. On the positive side, the density function of the latter is twice that of the former at each point on the x-axis

$$E\left(\frac{u}{\varepsilon}\right) = u + \sigma \frac{f\left(\frac{u}{\sigma}\right)}{F\left(\frac{u}{\sigma}\right)} \qquad \text{(A5)}$$

where f and F, respectively, denote the standard normal and cumulative normal density functions.

Once the u_is have been estimated, it is easy to determine the v_is by subtraction from the $\in$s.

Now it is natural to interpret the ratio $q_i = u_i/\bar{p}_i$ as the strength of brand is price signal. Let q denote the average of these values across all brands in the industry. Then q measures the magnitude of price signaling in the industry. These q values can be compared across industries to determine which industries are most inefficient in an informational sense.

The tests described above assume homoscedasticity. However, it is possible that the error terms are heteroscedastic. We therefore used the following procedure to test for homoscedasticity. Perform the White test (1980) for heteroscedasticity on the estimated residuals (v_is) in equation (5). If the hypothesis of homoscedasticity cannot be rejected, the results from the procedure described above will hold. If the hypothesis of homoscedasticity is rejected, it is necessary to respecify and reestimate the model. This procedure was not necessary for any of the product categories examined in the study.

Exhibit 2

ORIGINAL PAPER

Price and its Relation to Objective and Subjective Product Quality: Evidence from the Austrian Market

Erich Kirchler · Florian Fischer · Erik Hölzl

Abstract The correlation between price and product quality is usually found to be low, but still, consumers use a rule of thumb that higher prices indicate higher quality. In the present study, data from the Austrian consumer magazine *Konsument* from 2004 to 2007 were analysed, and price–quality correlations were computed. Results confirm former studies as the overall price–quality relation was positive and statistically significant but small ($r=.30$). It was especially small in the food and beverages sector as well as for cosmetics and for inexpensive products generally. Consumers' subjective beliefs about a price–quality link and product complexity were also analysed. Results show that consumers believe that a high price signals high quality, but that these beliefs are not well calibrated, i.e., not corresponding to the product categories where actually higher price–quality correlations can be found. In sum, the results confirm for the Austrian market that price is a poor signal of quality, and that consumers are hardly aware of the particular product sectors where this signal is more valid.

Introduction

Consumers are confronted with a wide variety of product information, supplied through advertising and branding, packing and characteristics of the point of sale, the price, and other cues, which enable the formation of preferences and purchase decisions. Consumers are usually seeking high-quality products at reasonable prices and look for information about the quality. Quality is not easy to assess, and in the case of high product complexity

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and the absence of other information, the price is often used as a signal of quality. However, research has shown that the correlation between price and quality as measured in consumer tests is often very low, making price a poor signal to infer quality from. In the present paper, data from Austrian consumer magazines for price–quality correlations were analysed and compared with earlier findings. The consumer perspective by eliciting subjective beliefs about a price–quality link and product complexity was also examined, and these beliefs were compared with objective price–quality correlations.

Price and Product Quality in Consumer Tests

In many countries, consumer magazines are available that publish product tests. These tests usually cover a set of comparable products from different brands, and they provide information on the market price as well as on the product quality as assessed by a group of experts. The correlation between price and expert-judged quality can be used as an indicator of the relation between price and "objective" product quality. Empirically, these correlations are often found to be low.

Among the first studies, Oxenfeldt (1950) computed rank correlations between price and quality of products tested in Consumer Union reports and found a median positive correlation of $r=.35$; however, correlations varied widely between $r=-.81$ and $r=.82$. Later reviews of the literature confirmed that the average price–quality correlations are positive but rather weak, ranging between $r=.01$ and $r=.68$ (Ratchford et al. 1996). A meta-analysis over nine studies published between 1950 and 1980 found an average correlation of $r=.31$, with no change over time (Tellis and Wernerfelt 1987). Another meta-analysis found an average correlation of $r=.16$ (Hanf and von Wersebe 1994). Overall, these studies show that the correlation between price and "objective" product quality is very weak: High-priced products are not necessarily those that also receive the highest rankings in independent consumer tests, and conversely, there are high-quality products available for low prices.

This overall picture was found in several countries (Imkamp 2004). As one example for the USA, Gerstner (1985) reported correlations of $r=.19$ for non-frequently bought products and $r=.01$ for frequently bought products. Bodell et al. (1986) reported an average of $r=.17$ for Canada and highlighted the similarities with the US market. For Japan, an average correlation of $r=-.06$ was reported (Yamada and Ackerman 1984). For the Netherlands, an average price–quality correlation of $r=.29$ was found (Steenkamp 1988). For Germany, Fürst et al. (2004) found a correlation of $r=.13$, which is on a similar level as the correlations of $r=.19$ and $r=.22$ reported in earlier work for Germany.[1] For Austria, Kollmann (1985) reported a median correlation of $r=.38$. Although in none of these countries the correlation is particularly strong, some degree of variation is observable.

Besides the rather low average price–quality correlation, there is also large variation across product categories. For example, in the German food sector, correlations were found to be even negative, i.e., more expensive products showing on average a lower quality (Schulze et al. 2008). Several moderating factors have been identified. For example, Gerstner (1985) found the price–quality correlation to be stronger for more expensive products; Steenkamp (1988) found it stronger for durables and for products with a larger price range. Meta-analyses showed that the correlation between price and

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[1] Note that some studies (Fürst et al. 2004; Schulze et al. 2008) use negative correlation signs as indicating that high price corresponds to high quality; the signs have been adapted here for comparability.

quality is stronger for products where consumers have more information, e.g., when products induce more search behaviour because the price range is larger, or when products can be easily inspected because they are unpackaged, or when product experience is extended over time because products are durable (Tellis and Wernerfelt 1987). Similarly, the correlation was found to be stronger for products where consumers can recognize quality more easily (Hanf and von Wersebe 1994); in particular, it increases with visibility, search costs, and prestige. For more complex products, therefore, it can be assumed that the correlation is weaker.

Several interpretations have been offered for the weak relation between price and "objective" quality. One line of argument sees the weak price–quality correlations as an indicator of imperfect markets, stating that in perfect markets, competition and consumer learning should eradicate high-price/low-quality products; the other line asks whether prices are valid cues for consumers to judge quality. The first view, low correlations indicating market failure, was put forward by several authors (e.g., Morris and Bronson 1969). It has been criticized, however, that market efficiency should be judged on occurring losses, and it was shown that the price–quality correlation is not a measure of losses (Ratchford et al. 1996), and other measures may be more appropriate. In particular, it has been criticized that studies on the price–quality correlation do not consider the number of transactions that occur (Imkamp 2003; Ratchford et al. 1996; Yamada and Ackerman 1984). If more transactions occur for products that offer a fit between price and quality, outliers (e.g., a high-price/low-quality product) are less influential; therefore, transaction-weighted corre-lations should be considered. Recently, the market failure argument was also criticized on a fundamental point, i.e., that prices are in the first place indicators of scarcity, not quality, and that therefore, from a consumer perspective, low correlations can be seen as favourable (Imkamp 2008).

The second view is less controversial: The low correlations imply that consumers using price as a cue to product quality are likely to err. In addition, it has been shown that choosing a high-price product also does not reduce the *risk* of getting a low-quality product (Hjorth-Andersen 1992). However, product quality is not a unidimensional concept, and consumers may use price as a cue for specific facets of quality (Brucks et al. 2000). It has been noted (Hjorth-Andersen 1992; Imkamp 2004) that consumer tests usually focus on measurable, objective characteristics and are therefore only an indicator for some aspects of product quality. More subjective aspects, such as prestige or design, are not contained. In addition, studies on the correlation between price and quality usually do not consider selling success of brands or search costs. Because search costs may be higher for particularly good offers, because brands with solid value-for-money may be more successful, and because products may also profit from image, the correlation between price and *subjective* quality may be considerably higher than suggested by these studies (Imkamp 2003, 2004). Still, if consumers want to receive good product quality as it is conceptualized by consumer reports, price remains a weak cue on which they should not rely.

From a consumer policy perspective, it would be reassuring if price would be a better cue at least for expensive product categories; however, previous research has shown that the price–quality correlation is only weakly related to price level (Hanf and von Wersebe 1994). It would also be reassuring if consumers would be aware that price and quality do not necessarily correspond and if they were able to correctly identify those product categories where the correlation between price and objective product quality is higher. It is therefore relevant to explore consumers' beliefs about the link between product quality and price.

Price and Product Quality from the Consumers' Perspective

Consumers often use price as a cue to judge product quality. In a classical study, Leavitt (1954) showed that price is used to infer quality if a variation in quality was assumed for that product. This is reflected in folk wisdom like "you get what you pay for" or in the use of a "expensive=good heuristic" (Cialdini 2001). In a meta-analysis of 36 studies, a positive relation between price and perceived quality was confirmed (Rao and Monroe 1989). This relation was moderately large ($r=.34$, $\eta^2=.12$); it was stronger for within-subjects designs and when the price range of products was larger, i.e., when comparability was easier. Interestingly, no effect of price level was found. A more recent meta-analysis (Völckner and Hofmann 2007) confirmed a positive, moderately strong relation ($r=.27$) between price and perceived quality. It was stronger for within-subjects designs, for durable goods, and for more expensive goods and weaker for goods consumers were familiar with. It was also stronger for European countries than for North American countries. In surveys, consumers also directly express the belief that the price of a product is positively linked to its quality, and more so for durable goods (Boyle and Lathrop 2009; Lichtenstein and Burton 1989). It has been suggested that using price to judge quality can be a time-saving heuristic, and that consumers apply this heuristic especially if product complexity is high, as is the case for pharmaceuticals or cosmetics (Kirchler 2003). Product complexity here refers to the fact that components or ingredients and their working mechanisms are difficult to understand and intransparent for laypersons; obtaining understanding would entail disproportionate effort. Product complexity seems particularly relevant considering the current markets where products become equipped with more and more functions, or new technologies like genetic engineering, make it more difficult for consumers to understand production. The assumption of consumers relying more on price for more complex products is in line with the findings that the link between price and perceived quality is weaker for familiar products (Völckner and Hofmann 2007). Consumers should therefore express a greater belief in a price–quality link for complex products.

If consumers believe that price is a cue for quality in certain domains, and if the validity of this cue for objective product quality varies across domains, the crucial question is whether consumers are well calibrated, i.e., whether they believe in this relation in the correct product categories. Studies on this calibration found that on average, correspondence between the price–quality correlation in product tests and the subjective beliefs of respondents is positive, but not particularly strong; it also differs between durable and non-durable goods (Boyle and Lathrop 2009; Lichtenstein and Burton 1989). This indicates that consumers have difficulties to identify those product categories where they could use the price of a product as a cue to its quality.

In the present study, two main research questions, one more economic and one more psychological, were examined. First, given the variation in price–quality correlations across countries, this issue for the Austrian market was re-examined. Data on prices and product quality were used, judged by experts and published in the Austrian consumer magazine *Konsument*; the correlations for different product categories and for different price levels were examined; and the results were compared with previous findings presented in the literature. Second, consumers' beliefs about the link between price and quality for different products and their beliefs about the complexity of these products were examined. These data were used to examine whether consumers believe that complex products show a higher price–quality link and to compare these beliefs with the results from the consumer tests where more complex products are expected to show a lower price–quality correlation. Finally, calibration was examined, i.e., the correspon-

dence between consumers' beliefs about the price–quality link and the consumer tests' price–quality correlations.

Price–Quality Relations in Consumer Tests in the Austrian Market

Method

Data were taken from 37 issues of the consumer magazine *Konsument* (www.konsument.at) in the period from November 2004 to November 2007. In these product tests, for each brand, the average price indicated in various stores (per unit or quantity, e.g., 1 kg, 1 L, or 100 ml) and overall objective quality, defined as average judgment of experts, were indicated. Quality was measured in various product attributes and finally summarized in ratings ranging from 1 (very good) to 5 (not satisfactory) and in a percentage rating (0% to 100%=excellent). Products within each test were ranked according to their overall quality.

The data set consisted of 210 product tests, involving 2,277 brands. The product tests were categorised in eight categories by the editors of the consumer magazine: (a) cars and transport, (b) construction and energy, (c) photography and music, (d) computers and telephone, (e) food and beverages, (f) leisure time and family, (g) health and cosmetics, and (h) home and garden.

Owing to the fact that in the 37 issues of the magazine *Konsument* for some product categories fewer than ten tests were available, tests were added from issues published before November 2004 in order to have at least ten product tests for each product category. Moreover, product tests involving fewer than four brands and tests on products without indication of prices or total quality were excluded.

The price–quality correlation was computed as Spearman rho correlation between the reported price and the expert-judged quality expressed as the rank of each brand within a product test. First, the correlations between price and quality within all 210 product tests were computed. Second, the average correlation within the eight product categories was computed, and third, the average correlation of all product categories was calculated. In each case, correlations were Fisher's z-transformed, averaged, and back-transformed, as suggested by Bortz (1999).[2]

Results

Correlations of prices and quality of brands varied considerably, from $r=-.89$ to $r=1.00$. Only 40 correlations (i.e., 19%) were positive and statistically significant at level $p=.05$; seven correlations (3%) were significant but negative. Figure 1 shows the frequency distribution of categorized correlations; it is skewed to the positive side.

Average correlations within product categories are presented in Table 1. Correlations vary considerably from $r=.06$ for health products and cosmetics and $r=.07$ for food and beverages to $r=.58$ for products in the computer and telephone sector. Figure 2 shows the correlations of product tests by product category and the average correlation for each of the eight product categories.

On average, the correlation of all eight product categories amounts to $r=.30$, which indicates a significant but moderate relation between price and quality. As analyses on the level of product tests and product categories show, however, correlations vary from

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[2] Due to Fishers's z-transformation, two product tests had to be excluded.

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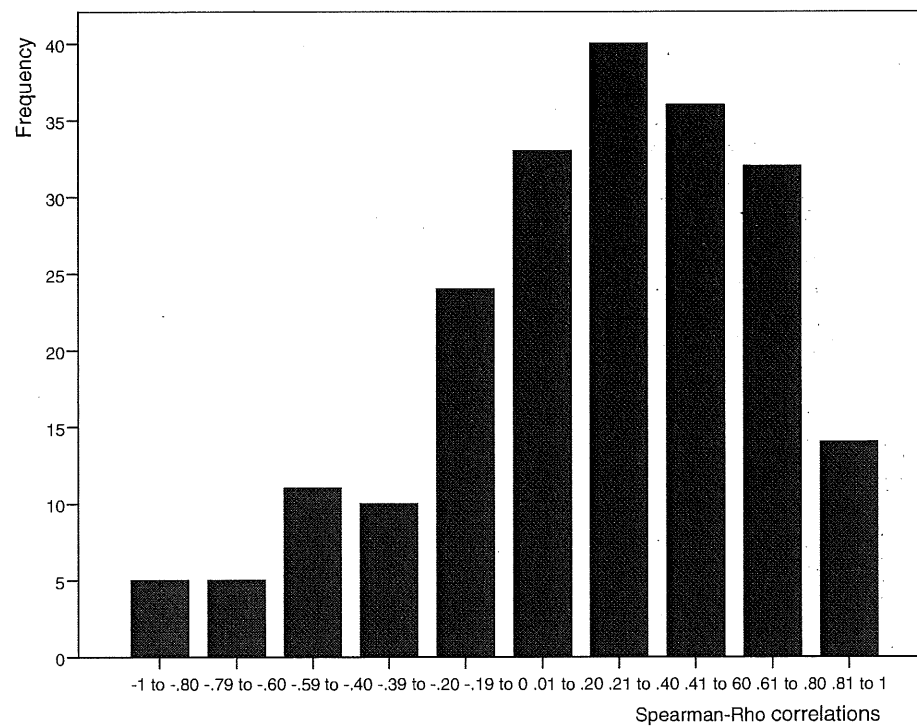
Fig. 1 Distribution of price–quality correlations in the Austrian market

significantly negative to significantly positive, and they are predominantly insignificant, so that the average correlation of r=.30 cannot be considered representative for all products.

Comparing these results with earlier results from Austria, the overall price–quality correlation seems to have declined slightly. Kollmann (1985) found 26 out of 60 (43%) product tests to show a significantly positive correlation, compared with 40 out of 210 (19%) in the present study. Also, the overall correlation of r=.38 (Kollmann 1985) was higher than the r=.30 in the present study. Regarding product categories, there are

Table 1 Price–quality correlations in the Austrian market, by product category

Product category	n brands	n product tests	r	p
(a) Car and transport	257	19	.34	<.01
(b) Construction and energy	174	16	.13	.09
(c) Video, camera, music	269	19	.42	<.01
(d) Computer and telephone	218	15	.58	<.01
(e) Food and beverages	272	25	.07	.24
(f) Leisure and family	408	40	.24	<.01
(g) Health and cosmetics	320	38	.06	.25
(h) Home and garden	351	36	.42	<.01
Overall	2,269	208	.30	<.01

r Spearman rho correlation

Spearman-Rho correlations
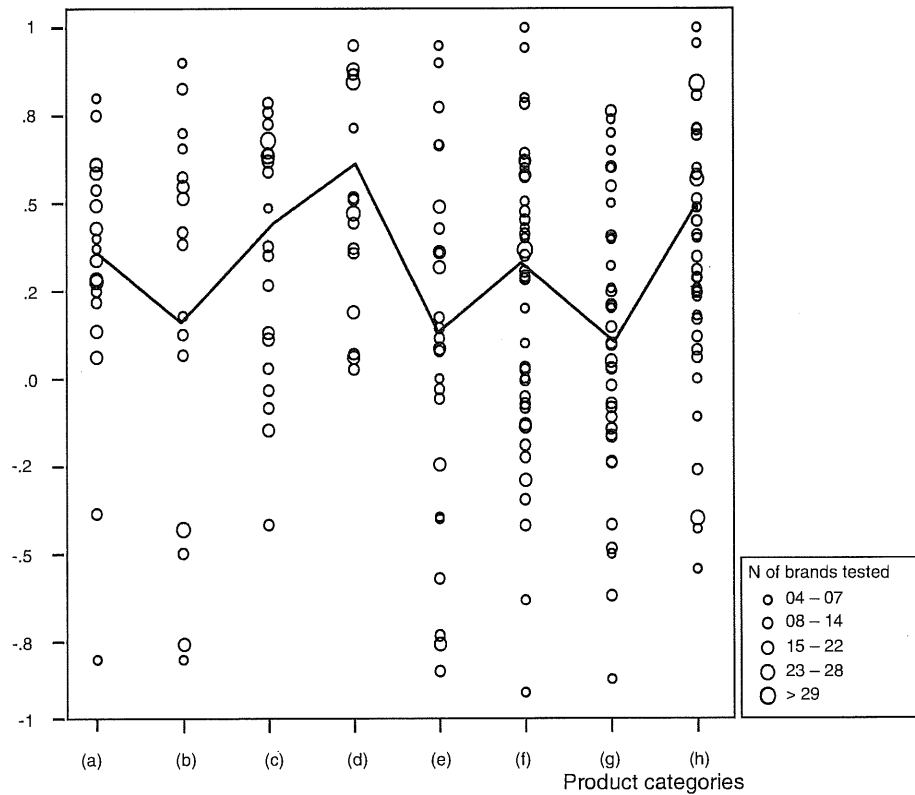
Fig. 2 Price–quality correlations in the Austrian market, by product category. Note: The *solid line* represents average correlations in the eight product categories: (*a*) car and transport, (*b*) construction and energy, (*c*) video, camera, and music, (*d*) computer and telephone, (*e*) food and beverages, (*f*) leisure and family, (*g*) health and cosmetics, and (*h*) home and garden

important caveats: Products are difficult to compare over a 20-year period (e.g., computers and mobile phones), some categories were not represented in Kollmann (1985; e.g., food and beverages or health and cosmetics), and category results also depend on the particular product tests conducted in the period under examination. A cautious interpretation would be that in both studies, the correlation in high-tech categories was stronger than in other categories, e.g., $r=.55$ for entertainment electronics (Kollmann 1985) versus $r=.42$ for video, camera, and music and $r=.58$ for computer and telephone in the present study.

Comparing these results with recent studies in Germany—being the largest trading partner for Austria—it is noteworthy that the average correlation in Austria seems to be stronger. Both the present $r=.30$ and the past $r=.38$ (Kollmann 1985) are higher than the $r=.13$, $r=.22$, and $r=.19$ reported by Fürst et al. (2004). Similarities between the German and the Austrian market can be seen in the low correlations for the food and beverages sector, $r=.02$ (Fürst et al. 2004) and $r=-.12$ (Schulze et al. 2008) versus $r=.07$ in the present study, and for the health and cosmetics sector, $r=-.04$ (Fürst et al. 2004) versus $r=.06$ in the present study. In both countries, comparatively strong correlations were found

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in the category home and garden, $r=.26$ (Fürst et al. 2004) versus $r=.42$ in the present study.

One research question related to price level of products, i.e., whether the price–quality correlation is stronger when the costs for a product are higher. For instance, for food and beverages, neither our study nor other studies showed a strong price–quality correlation, and food is usually on a low-cost level. Hanf and von Wersebe (1994)) found stronger correlations for more expensive products, and Tellis and Wernerfelt (1987) found stronger correlations for durables with a higher price range. For the present study, product tests involving products which cost 10€ or less were separated from product tests involving products which cost 10.1 to 100€, 100.1 to 500€, 500.1 to 1,000€, and 1,000.1€ or more, and the average price–quality correlations were computed separately for each cost category. As shown in Table 2, correlations are different depending on the cost category: The higher the costs, the higher the correlation between price and objective quality. The increasing pattern, however, discontinued for products costing more than 1,000€. These findings are in line with previous findings (Gerstner 1985; Hanf and von Wersebe 1994), but also suggest a curvilinear relation.

Consumers' Subjective Beliefs about Product Complexity and Price–Quality Links

Method

Overall, 41 consumers completed a questionnaire on their beliefs about the link between price and product quality and about product complexity, covering the 136 products contained in the 208 product tests analysed above. Average age of respondents was 32.6 years (SD=14.4); 56% were male, and 44% were female.

For assessing *subjective product complexity*, respondents had to rate each product on a five-point scale ranging from "The product is very easy/transparent" to "The product is very complex/intransparent." For assessing the *subjective price–quality link*, respondents had to rate each product on a five-point scale ranging from "A high price indicates very poor quality" to "A high price indicates very good quality;" the midpoint of this scale was explained as "Price is unrelated to quality." It should be noted that responses from the questionnaire were only used on the aggregate level, i.e., as indicating an average belief

Table 2 Price–quality correlations, by price category

Price category	*n* brands	*n* product tests	Percent of brands tested	*r*	*p*
<10€	618	59	28.4	−.01	.75
10.1–100€	625	62	29.8	.31	<.01
100.1–500€	658	54	26.0	.47	<.01
500.1–1,000€	196	18	8.7	.53	<.01
>1,000€	172	15	7.2	.25	<.01

r Spearman rho correlation

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about a specific product, and therefore, the number of respondents was considered sufficient to provide a stable estimate.

Results

In a first step, the subjective beliefs about product complexity and the price–quality link (Table 3) were analysed. Regarding subjective product complexity, respondents judged the products as moderately easy and transparent (M=2.59, SD=0.38 on a five-point scale). Complexity judgments differed across product categories: The most complex products were assumed to be video and photo cameras and music items (M=3.06, SD=0.30), whereas food and beverages were judged to be the least complex (M=2.19, SD=0.24). The subjective price–quality link, on average, was moderately strong (M=3.67, SD=0.29 on a five-point scale), i.e., on average, respondents expressed the belief that a high price indicates good quality. Variation across product categories was small: While the strongest link was assumed to be in the car and transport sector (M=3.87, SD=0.40), the weakest link was assumed in the food and beverages sector (M=3.52, SD=0.27). Beliefs about product complexity and price–quality link were, on average, positively correlated (Spearman r=.22): On average, respondents therefore stated that more complex products also show a stronger link between price and quality. However, this pattern was very heterogeneous across product categories. Whereas the correlation was positive for the food and beverages sector and the home and garden sector (r=.51 and r=.50), it was negative for the car and transport and the computer and telephone sector (r=−.57 and r=−.43). This indicates that consumers' beliefs are not generalized.

In a second step, the correspondence between these subjective beliefs and the results from the consumer tests (Table 4) were analysed. On average, the correlation between consumers' beliefs about product complexity and consumer test results on the price–quality correlation was positive (r=.14, p=.04). More complex products therefore seem to exhibit a slightly stronger price–quality correlation, but this needs to be qualified by the large variation across product categories (r=−.38 in construction and energy to r=.32 in food and beverages).

Table 3 Subjective beliefs about product complexity and price–quality link

Category	n	Subjective product complexity		Subjective price–quality link		r	p
		M	SD	M	SD		
(a) Car and transport	19	2.76	0.37	3.87	0.40	−.57	.01
(b) Construction and energy	16	2.99	0.39	3.56	0.25	−.18	.50
(c) Video, camera, music	19	3.06	0.30	3.74	0.24	.33	.17
(d) Computer and telephone	15	2.98	0.21	3.79	0.21	−.43	.11
(e) Food and beverages	25	2.19	0.24	3.52	0.27	.51	.01
(f) Leisure and family	41	2.44	0.15	3.78	0.28	.05	.75
(g) Health and cosmetics	37	2.45	0.26	3.54	0.20	−.03	.87
(h) Home and garden	36	2.50	0.25	3.63	0.24	.50	<.01
Overall	208	2.59	0.38	3.67	0.29	.22	<.01

Estimates for each product are based on responses by 41 consumers

n product tests, r Spearman rho correlation

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Table 4 Correspondence between price–quality correlations in consumer test results and subjective beliefs

Category	n	Subjective product complexity		Subjective price–quality link	
		r	p	r	p
(a) Car and transport	19	.01	.98	.24	.32
(b) Construction and energy	16	−.38	.15	.30	.26
(c) Video, camera, music	19	.26	.29	.21	.40
(d) Computer and telephone	15	.17	.54	.05	.85
(e) Food and beverages	25	.32	.11	.57	.00
(f) Leisure and family	41	−.20	.21	−.10	.52
(g) Health and cosmetics	37	−.33	.05	−.13	.45
(h) Home and garden	36	.19	.26	.33	.05
Overall	208	.14	.04	.23	<.01

Estimates for each product are based on responses by 41 consumers

n number of products, *r* Spearman rho correlations

Finally, calibration of consumers, i.e., the correlation between subjective beliefs about the price–quality link and consumer test results on the price–quality correlation, was positive ($r=.23$, $p<.01$). On average, consumers seem, to some extent, to recognize those products where consumer tests verify a positive relation between price and quality. To embed our findings with previous research, the data from five studies presented in related articles (Boyle and Lathrop 2009; Lichtenstein and Burton 1989) were reanalyzed to make them comparable.[3] In these studies, 15 to 18 product tests were used and examined for correspondence between objective and perceived price–quality relations. Our reanalysis yielded correlations of $r=.15$, $r=.20$, $r=.25$, $r=.30$, and $r=.30$. Overall, these levels of calibration are similar to the overall level found in the present study.

However, when broken down in product categories, again large variation can be found, and the only large correlation occurs in the food and beverages sector. Also, the overall correlation of $r=.23$ would translate in only 4% explained variance. These results indicate that consumers are not able to correctly identify those products where consumer tests indicate a positive price–quality relation.

Discussion

The results of the present study suggest that for Austrian markets, price is not a reliable signal of quality which consumers should use. Our results are in line with previous findings from the beginning of price–quality correlation studies (e.g., Morris and Bronson 1969; Oxenfeldt 1950) until the present (Fürst et al. 2004; Schulze et al. 2008); in most of these studies, correlations are positive but low and most frequently occur between $r=.20$ and $r=.30$ (Hjorth-Andersen 1992). In the present study, for the Austrian market, the average correlation between price and quality was moderately positive ($r=.30$), ranging from highly negative to highly positive across different product tests. It was especially small in the food

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[3] Lichtenstein and Burton (1989) used classified values of price–quality relations (positive, near-zero, and negative) for their calculations; our reanalysis used the precise values.

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and beverages sector as well as for cosmetics and inexpensive products. For more expensive products, the correlation increased. The average correlation in the present study was lower than in an earlier study in Austria (Kollmann 1985), but higher than in Germany (Fürst et al. 2004). Given the average correlation of $r=.30$, only 9% of quality variance can be explained by price variance. Consumers using price as an indicator for product quality, as measured in consumer tests, are therefore likely to make mistakes.

From a consumer perspective, subjective beliefs about price–quality relations are more positive. The results of the present study, in line with earlier research (e.g., Lichtenstein and Burton 1989), show that consumers believe that a high price usually indicates high quality, with little variation across product categories. Consumers also believe that, on average, for more complex products, the price–quality link is slightly stronger ($r=.22$), although the results are heterogeneous across product categories. Bringing these beliefs into connection with the results on the correlation between price and objective product quality, more complex products on average show a slightly larger price–quality correlation, but this correspondence ($r=.14$) again is heterogeneous across product categories. Finally, calibration of consumers, i.e., the correspondence between subjective beliefs about a price–quality link and the price–quality correlations from the consumer tests, on average was positive ($r=.23$), but varied widely across product categories. To summarize, consumers do believe that price signals quality but do not to have a correct understanding about when and for what particular product categories the price could—to some extent—be used as a signal of quality. Consumers seem to be aware of considerable product-to-product variation in price–quality relations, but they fail to indicate the particular product sectors for which prices are positively related to quality. Consumers' rule of thumb "price indicates quality" is likely to lead to suboptimal purchase decisions.

There are several problems with respect to measurement of price–quality relations which limit the conclusions drawn from former as well as the present studies. The first problem is the definition of quality (e.g., Hjorth-Andersen 1992; Imkamp 2004). Testing agencies examine only product characteristics that are amenable to quality measurement. While this may be adequate for some commodities, there are serious shortcomings when consumers' decisions depend on their taste in style and design, image of the company, and other subjective aspects (Imkamp 2008). For some commodities, especially prestige products, the price itself even may become a property to be demanded. The second problem is with international comparisons. Due to differences in the product portfolio, comparisons of product categories are difficult, even within the same country over time (Fürst et al. 2004). Results on the price–quality correlation are to some degree heterogeneous across countries, and the reasons for this variation still need to be explored. The third problem is the measurement of consumers' beliefs. When surveyed whether price indicates quality, consumers may become aware that this is not always the case and qualify their responses. However, in a purchasing situation, this rule of thumb may become more influential because it is time saving and socially accepted.

Implications for consumer policy can be seen as twofold. On one hand, consumer protection agencies might think about ways of making it easier for consumers to identify those products with good value-for-money, i.e., those products that contribute to a stronger correlation. However, as Imkamp (2008) points out, a stronger correlation may not be desirable if higher prices signal scarcity. On the other hand, consumers may be educated in the sense of being made aware of the rules of thumb they use in purchase decisions and the limits of these heuristics. In particular, they may be made aware that price is not a good signal for "objective" product quality. Testing agencies and consumer magazines could contribute to this goal by including correlation results in their reports.

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Exhibit 3

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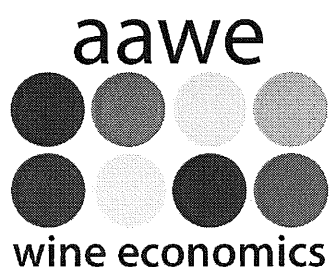
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EXPERT OPINION AND QUALITY PERCEPTION OF CONSUMERS: EVIDENCE FROM NEW YORK CITY RESTAURANTS

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Expert Opinion and Quality Perception of Consumers:
Evidence from New York City Restaurants

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Abstract

Exploiting a natural experiment for New York City restaurants we analyze whether consumers' quality perception is influenced by newly appearing expert opinion. As the leading restaurant guide *Zagat* has rated New York City's restaurants since 1979 by drawing on consumer surveys. In 2005, with the first release of the red *Michelin Guide New York City*, *Zagat* faced a serious competition. In contrast to *Zagat*, *Michelin* relies on experts. Employing a difference-in-differences approach we analyze whether consumer assessments (*Zagat* ratings) have responded to *Michelin* quality assessments. While we do not find any significant Michelin-induced increase in perceived food quality, we find strong Michelin effects on service and décor quality. In addition, the inclusion in the Michelin guide induced substantial price increases. While restaurants that were not Michelin-reviewed can raise their prices in response to food quality improvements, service and décor improvement do not payoff. In contrast, Michelin-reviewed restaurant enjoy substantial returns only to service and décor improvement. Our results suggest that expert opinion on the New York City restaurant market exerts a negative externality on gourmets by giving restaurants incentives to invest mainly in service and décor leading to higher prices.

I. INTRODUCTION

In the presence of information asymmetries consumers often rely on expert opinion to guide their purchase decision. An increasing body of economic literature analyzes the effect of critical assessments on prices and quantity consumed for a wide variety of experience goods such as wine, movies, hotel rooms or books. All of these papers analyze the outcome of influenced quality perception of consumers.

Our paper is less focused on the question whether expert opinion impacts quantity or price of the good in question but rather examines consumers' quality perceptions and their possible changes directly. We analyze whether suddenly appearing expert opinion, on a market with long-standing published consumer-assessed quality evaluations, can alter consumers' quality perception and subsequently change prices? Will consumers stick to their original assessments or will they herd towards the expert's opinion?

We investigate this question by referring to restaurants in New York City and exploiting a natural experiment. As the undisputedly leading restaurant guide,[1] *Zagat* has rated New York City's restaurants since 1979. *Zagat* publishes its guidebook once a year by drawing on consumer surveys. It, therefore, reflects local residents' restaurant preferences, which, until 2005, had been only scantly influenced by experts. There had not been any expert guides to New York City restaurant before 2005. Nationwide expert guides such as the *Mobil Travel Guides*, *Fodor* or the *AAA TourBook* series, for various reasons, have never had any mentionable impact on New York City diners (Ferguson, 2008; Davis, 2012). Although the *New York Times* has published weekly reviews and assigned quality ratings to local restaurants since 1963, the number of reviews has hardly exceeded 50 per year – mostly focused on new openings. In comparison, Zagat reviews about 2000 restaurants per year. This and the fact that the reviews are spread over about 50 *New York Times* issues substantially limited its influence and never challenged *Zagat's* position.[2]

In November 2005, however, with the first release of the red *Michelin Guide New York City*, the first one ever for the United States, *Zagat* faced a serious competition. In its first year, *Michelin* reviewed 471 restaurants and sold more than 100,000 copies (Krummert, 2006). In

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[1] On average, about 650,000 copies of the New York City guide are sold per year. In addition, *Zagat* reports 384,000 unique visitors to its paid online subscription service for 2008 (Davis, 2012).

[2] For a comprehensive overview of New York City restaurant reviews, their history, focus and impact, see Davis (2012).

contrast to *Zagat*, *Michelin* relies on experts, i.e., five anonymous professional test eaters. According to Ferguson, while Zagat is a plebiscite, Michelin is a tribunal (Ferguson, 2008).

Although the advent of the *Michelin Guide* was excitingly anticipated in New York,[3] when it finally appeared the results were met with surprise, even with dismay. Many of the city's well-regarded restaurants were not awarded a *Michelin* star while others received unexpected honors (e.g., Kurutz, 2005; Fabricant, 2005b; Cuozzo, 2005a). The press detected a bias toward French-owned venues and the *New York Post* even called the Michelin Guide the "idiot's guide" (Cuozzo, 2005b). "After learning that *Babbo* had received [only] one star, Mario Batali[4] said he didn't think New Yorkers would give much credence to the guide. He was not happy with that ranking, the same as for the *Spotted Pig*, of which he is a part-owner. 'They're blowing it,' he said. 'They can't put the *Spotted Pig* on the same level as *Babbo*'" (Fabricant, 2005b).

What credence did New Yorkers give to the *Michelin Guide*? When tackling this question we do not analyze who of the two assessments, consumer or expert ratings, are closer to (unobserved) "true quality."[5] Instead, we analyze whether *Zagat* ratings have responded to *Michelin* quality assessments and employ a difference-in-differences approach for the years 2004, i.e., two years before the first New York City Michelin edition, and 2007, one year after its publication.

We find that Marco Batali's assessment was correct. Despite the media frenzy in 2005, consumers have not adjusted their food quality perception toward the judgment of the *Michelin Guide* experts. However, and despite Michelin's claim to only be guided by the food's quality and not by décor or service, we find a strong and significant *Michelin* effect on consumers' décor quality perception. At a lower significance level, we also find also find a somewhat smaller effect on *service* quality ratings. It is *a priori* unclear whether these effects are based on demand side imaginations or whether the reviewed restaurants have in fact invested in décor and service enhancements. Since the *Michelin* treatment has not influenced

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[3] See, e.g., Florence Fabricant in *The New York Times* (Fabricant, 2005a).
[4] Marco Batali, a Rutgers University economics major, is the chef and owner of New York City icon restaurant *Babbo*. He is best known for his Food Network show *Molto Mario* and his role in *Iron Chef America*.
[5] In contrast to national restaurant guides, *Zagat* ratings reflect the vote of the local population and are based on a local reference. Therefore, *Zagat* ratings are not comparable across cities and rather denote a local ranking (see also Berry and Waldfogel, 2010).

consumers' food quality perception we assume the latter, i.e., *Michelin*-reviewed restaurants have in fact improved their décor.

We also find that restaurants are able to pass this non-food-related investment on to consumers. For the mere inclusion into the *Michelin Guide* we find a substantial marginal price effect of approximately 37% from 2004 to 2007. A price increase of this magnitude may well be in excess of service-induced cost increases. Our analysis thus suggests that expert food reviews may provide restaurants with additional profits for non-food investments.

This remainder of this paper is organized as follows. Section II provides a review of the related theoretical and empirical literature. In Section III we present our data and in Section we outline our econometric approach. Section V reports the results and draws conclusions; Section VI summarizes the main findings.

II. LITERATURE

There is an extensive body of literature on producer and consumer behavior in the presence of experience goods, i.e., goods for which quality cannot be ascertained prior to consumption. Beginning with the analyzes of Nelson (1970; 1974) most of the early literature was theoretical in nature and focused on the firm and its scope of quality signaling through advertising, warranties, reputation or pricing (e.g., Schmalensee, 1978; Shapiro, 1983; Wolinsky, 1983; Milgrom and Roberts, 1986; Bagwell and Riordan, 1991; Tirole, 1996). Parallel, an increasing number of empirical papers appeared analyzing firms' signaling from an economic and a marketing perspective for various goods (e.g., Riesz, 1978; Tellis and Wernerfelt, 1987; Curry and Riesz, 1988; Caves and Greene, 1996; Schnabel and Storchmann, 2010). Many of these papers model consumers' quality perception and its formation implicitly. For instance, Bagwell and Riordan (1991) assume that the credibility and scope of signaling quality through pricing declines as consumer become increasingly informed.

In contrast, there is also a growing body of explicit consumer-related literature focusing on the role of peers and experts on consumer preferences. All of these analyses draw on the assumption that the decisions of other consumers or the assessment of experts contain choice-relevant information. The literature on the influence of peers or "social learning" on

individual decisions is based on informal approaches in the psychological literature (e.g., Deutsch and Gerard, 1955; Bandura, 1977). For instance, Becker (1991) developed a formal model in which the demand for a good, here a restaurant meal, depends positively on its aggregate quantity demanded, i.e., on peer demand. Banerjee (1992) and Bikhchandani et al. (1992 and 1998) describe localized conformity, fashions and "herd behavior" as the result of informational cascades where the decision of an individual is influenced by the actions of other individuals before him. Since, in these models, the individual is willing to give up his private information and only follows the preceding peers, the peers' actions do not contain any information and the resulting equilibrium may be inefficient.

McFadden and Train (1996) also hypothesize that consumers learn from other consumers but still utilize their private information. They formalize consumer learning about a new good's quality through a rational decision process between learning from own experience or from the experience of their peers.[6] Morris and Shin (2002) show that, when agents have private information, they might overreact to expert opinion. Compared to a welfare-maximizing planner, consumers put too much weight on the public expert's signal and devalue their private information; this may lead to detrimental welfare effects of expert opinion.

On the empirical side, Salganik et al. (2006) created an artificial "music market" in which participants downloaded previously unknown songs. They show that, when providing the treatment group of users with information about other users' music ratings, social learning is a strong determinant of a song's success. Moretti (2011) empirically examines the model of social learning for movie sales from 1982 to 2000. He analyzes movie sales over time compared to prior expectations, measured by the number of screens dedicated to a movie in its opening weekend, and finds a reinforcing pattern. When a movie exceeds expectations in its opening week consumers update their expectations leading to further increasing sales etc. Liu (2006) finds similar results for word-of-mouth effects on movie sales by referring to consumers' internet postings. Cai et al. (2009) set up a randomized natural field experiment in which they assess consumer choices of restaurant menu items. If provided with a (made up) list of "last week's top 5 selling dishes," consumers tend to follow their peers' consumption.

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[6] Peer or social learning models are related to the earlier literature on technology adoption, where the spreading of new technologies is based on peer imitation (e.g., Griliches, 1957).

In addition to the literature on social learning from peers, there are also numerous papers that confirm the influence of experts on markets. The effect of experts on market outcomes is hard to measure since expert reviews and "true quality" are often closely correlated. Hence, most studies draw on natural (or real) experiments or make statistical inferences to disentangle the two.

For instance, Ginsburgh (2003) reports that experts significantly determine the market success of movies (through Oscars) and, although to a lesser degree, of books (through the *Pulitzer Prize*). Reinstein and Snyder (2005) examine the impact of critical reviews on movie box revenues and also find positive effects of favorable reviews. Ginsburgh and van Ours (2003) analyze the Queen Elizabeth piano competition in Belgium and find that musicians who are successful in the competition will be rewarded by subsequent market success. Similarly, experts affect sales prices for paintings at art auctions by publishing pre-sale estimates in auction catalogues (Bauwens and Ginsburgh, 2000).

Hadj Ali, Lecocq and Visser (2008) analyze the effect of critical points awarded by wine writer Robert Parker on the *en primeur* price of Bordeaux wine. While *en primeur* prices are usually set after the wines have been sampled by Parker, this paper exploits the fact that in 2003 Parker postponed his Bordeaux visit and prices were set after before Parrker's review. They find Parker points to have a significant but small effect on the wine price. Dubois and Nauges (2010) also study the effect of Parker points on *en primeur* prices of Bordeaux wines. They employ a structural empirical approach to disentangle the effect of experts' grades and unobserved quality on the wine price and find a significant "Parker effect." Closer related to our research, Gergaud et al. (2007) find a substantial influence of expert ratings, measured by *Guide Michelin* stars, on Paris restaurant menu prices.[7]

In contrast to price analyses, there are only a few papers that examine the impact of expert opinion on quantity consumed. Drawing on a field experiment in wine retail stores, Hilger et al. (2011) show that favorable expert reviews have a positive influence on quantity consumed, independent of quality. On the other hand, wines that obtained below-average ratings exhibit a decrease in demand. Friberg and Grönqvist (2012) analyze the impact of expert opinion on quantity consumed by referring to the Swedish wine market. They find a substantial and long-

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[7] Additional examples of expert opinion leadership can be found, e.g., on sport betting markets (Avery and Chevalier, 1999) or on the stock market (Shleifer, 1986).

lasting effect (more than 20 weeks) of positive reviews. In addition, they also find positive demand effects of neutral reviews and do not find any negative effects of unfavorable reviews.

However, consumers' quality perception is not only influenced by own or others' experience but is also responsive to the respective consumption environment. There is plenty of evidence that consumers make contextual inferences (Kamenica, 2008)[8] and are sensitive to the framing of the decision situation (e.g., Tversky and Kahneman, 1981). For instance, North et al. (1999) show that consumers respond to the kind of music played in a wine store. When French music was played, customers bought more than three times as many French wines than German wines. When German music was played the opposite was true. Wansink et al. (2009) report that the quantity of food we eat is only partially determined by what we were planning on consuming. Environmental factors such as package size, plate size and shape, lighting, variety etc. affect our food consumption volume far more than we realize. Plassmann et al. (2008) even show that marketing actions, such as changes in the price of a product, can affect neural representations of experienced pleasantness. In a laboratory experiment, they scanned human subjects using functional Magnetic Resonance Imaging (MRI) while the subjects tasted identical wines that they believed to be different and sold at different prices. Assumingly expensive wines yield increased reports of flavor pleasantness as well as blood-oxygen-level-dependent activity in the medial orbitofrontal cortex, an area that is widely thought to encode for experienced pleasantness during experiential tasks.

However, contextual quality perceptions are not confined to consumers only. In fact, there is ample evidence that experts' quality assessments may be flawed, biased, inefficient or even utterly made up. It has been shown numerous times that mechanical rules outperform expert advice. For example, Krueger and Wu (1998) suggest that mechanical rules may outperform admission committees when judging the success of economics graduate students. Likewise, Bill James' data-driven baseball talent scouting significantly outperforms intuitive experts' judgments (Ayres, 2007). For the Queen Elizabeth Competition mentioned above, Ginsburgh

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[8] Kamenica (2008) formalizes a model on consumers' contextual inferences in the presence of product lines. For compromise effect ("neither buy the most nor the less expensive item on the list") and overload choice (i.e., an excessive choice set induces a preference for fewer and simpler options) he shows that the context may contain choice-relevant information reconciling these apparent anomalies with standard rational utility maximization. Alternatively, if the context such as expert opinion does not contain any information about the good, it may be deliver a prestige value by itself, akin to the "warm glow" effect demonstrated to be an important component of charitable giving (Karlan and List, 2007).

and van Ours (2003) report that the order and timing of appearance at the competition are good predictors of the final ranking. Judges systematically prefer those players who perform later in the competition. Ashenfelter and Jones (2012) and Ashenfelter (2008) examine the reliability of wine experts and find that experts' ratings are not efficient predictors for mature Bordeaux wine prices because they fail to incorporate all of the publically available information (such as weather).

Another wine-related example of expert failure concerns the *California State Fair Wine Competition*, the oldest and most prestigious wine competition in North America, awarding Gold, Silver and Bronze medals to submitted wines. Unknown to the wine judges, three identical pourings from the same bottle were included into each 20-wine-flight. While the identity of each wine was concealed a reliable wine judge would assess the quality of identical wines similar. However, as reported by Hodgson (2008), more than 80% of the judges scored the same wine more than two medal groups apart (from Gold to "no medal"); the 20% who did not failed to repeat their performance in the following years. In another paper, Hodgson (2009) statistically analyzes medals awarded in 13 national wine competitions. He was puzzled by the fact that a wine can score a Gold in one competition but receive no medal in others. His study suggests that "winning a Gold medal is greatly influenced by chance alone." (Hodgson, 2009, p. 1).

For the restaurant sector, while experts claim to assess food quality only, they cannot refrain from taking into account non-food framing elements, such as the look of the venue or the choice of wines in the cellars (Chossat and Gergaud, 2003). An extreme example of misleading expert advice is reported by Goldstein (2008) and Ashenfelter et al. (2010). The U.S. wine magazine *Wine Spectator* awarded its prestigious "*Award of Excellence* for having one of the most outstanding restaurant wine lists in the world" to the Milan restaurant *Osteria L'Intrepido*, a venue that does not even exists.

Given the significance of learning from peers and experts and the issues that are inherent to both groups this paper tackles the following question. Against the background of well-established and relatively stable peer reviews and quality perceptions, can suddenly appearing expert opinion exert authoritative influence on consumers and change their quality assessments? To answer this question we refer to a natural experiment.

As New York City's leading restaurant guide, *Zagat* has published consumer reviews of restaurants for more than three decades. Consumers rate a restaurant's food, service and décor. Only in 2006 these consumer ratings faced the competition of considerable expert assessments, i.e., the first publication of the New York City *Michelin Guide*. Michelin only rates the food of a restaurant and oftentimes disagrees with consumer preferences. Did consumers change their assessments, as published in the 2007 *Zagat Guide*, after learning from the experts?

III. DATA

We are interested in whether consumers' restaurant quality perceptions, i.e., *Zagat* ratings, have been influenced by the publication of *Michelin* expert opinion in 2006. The dataset we employ covers all New York City restaurants considered in both the 2004 and 2007 *Zagat* Surveys. These years correspond to two years before and one year after the first publication NYC *Michelin*. We draw on 2004 instead of 2005 data to rule out that our results are influenced by possible *Michelin* announcement effects on consumer assessments or on chef efforts.[9]

In the 2004 issue, Zagat published a total of 1,918 restaurant reviews based on the ratings of almost 26,000 reviewers (Zagat Survey, 2003). In the 2007 issue, it rated 2,014 establishments based on reports of 31,604 restaurant-goers (Zagat Survey, 2006). After removing all chain restaurants from this list, we are left with 1518 observations. For each restaurant *Zagat* provides an average consumer-reported price charged for a reference dinner including one drink and tip for each restaurant. It also provides information on the consumer-perceived quality of food, décor and service on a scale ranging from 0 to 30 points separately for each category. In addition, *Zagat* lists some 90 different ethnic cuisine categories[10] that we

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[9] The publication of the first New York City *Michelin* guide was announced in February of 2005.

[10] These categories are the following: Afghan, American New, American Regional, American Traditional, Argentinean, Asian, Australian, Austrian, Bakeries, Barbecue, Belgian, Brasserie, Brazilian, Burmese, Cajun/Creole, Californian, Caribbean, Chinese, Coffeehouses/Dessert, Coffee Shops/Diners, Colombian, Continental, Cuban, Delis/Sandwich Shops, Dim Sum, Dominican, Dutch, Eastern European, Eclectic/International, Egyptian, English, Eritrean, Ethiopian, Filipino, Fish 'n' Chips, French, French Bistro, French New, German, Greek, Hamburgers, Health Food, Hot Dogs, Hungarian, Indian, Indonesian, Irish, Israeli, Italian, Jamaican, Japanese, Jewish, Korean, Lebanese, Malaysian, Mediterranean, Mexican/Tex-Mex, Middle Eastern, Moroccan, Noodle Shops, Nuevo Latino, Persian, Peruvian, Pizza, Polish, Portuguese, Puerto Rican, Russian, Sandwich Shop, Scandinavian, Scottish, Seafood, Soups, South African, South American,

bundled into nine broad categories to avoid singletons: Africa, Asia, Central America, Eastern Europe, Middle East, North America, South American, Western Europe, and Other.

Our treatment group consists of the 471 restaurants that were reviewed in the first *Michelin Guide*, 2006 edition (Michelin Travel Publications, 2005). In contrast to *Zagat*, the *Michelin Guide* claims to review the quality of food only; neither décor nor service quality should affect its rating.[11] *Michelin* rates a restaurant's food quality on a scale from zero to three stars.

Table 1 provides the descriptive statistics for food, service, décor and prices for all restaurants in 2004 and in 2007. For 2007, we also report separate numbers for *Michelin*-reviewed and un-reviewed restaurants. From 2004 to 2007, the mean value in each category, including prices, has increased for the restaurants overall. However, Table 1 also shows that *Michelin*-reviewed restaurants attain higher scores and charge higher prices than non-reviewed restaurants, which can simply be a selection result.

[Insert Table 1 here]

Table 2, therefore, reports the descriptive statistics for each group, control and treatment group, before and after the *Michelin* review. Expectedly, the treatment group was rated higher than the control group in each category, i.e., food, service and décor. This is true before as well as after the treatment. In addition, the mean values for each group and category remained virtually unchanged between 2004 and 2007. In contrast, the average price of the restaurants in treatment group grew significantly after the *Michelin* review. In addition, the dispersion, measured by the Coefficient of Variation (CV)[12] within each category is almost undistinguishable between treatment and non-treatment group on the one hand and over time on the other hand. This also applies to the price dispersion of the non-treatment group in 2004 and 2007 and the treatment group in 2004. After the treatment, however, the reviewed restaurants experienced a substantial increase in price dispersion: the CV of prices grew from 34.1% to 52.4%, suggesting a considerable injection of noise caused by published expert

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Southern/Soul, South Western, Spanish, Steakhouses, Swiss, Tapas, Tea Service, Thai, Tibetan, Tunisian, Turkish, Ukrainian, Vegetarian, Venezuelan, Vietnamese.

[11] The *New York Times* quotes Jean-Luc Naret, the director of the *Michelin Guides*, " *Michelin* stars refer only to what is on the plate." (Fabricant, 2005a).

[12] We calculate the CV as standard deviation to the mean, $CV = \sigma / \mu$

opinions. Figure 1 shows the corresponding Kernel density functions, which suggest that treatment group prices have stretched out especially at the high end.

In Table 3 we show the percentage growth rates from 2004 to 2007 in each quality category and in prices separately for treatment and non-treatment group. Although these numbers are uncontrolled for effects such as food ethnicity, they still convey a few interesting developments. First, while we find a perceived food quality improvement for non-treated restaurants of 2.43%, the treatment group exhibits a small decline. Second, and despite the lack in food enhancement, the treatment group shows a substantial price increase of 8.52% while there is almost no increase for unreviewed restaurants.

[Insert Table 2 here]

[Insert Figure 1 here]

[Insert Table 3 here]

This overview, however, disregards any influence of variables such as food ethnicity (cuisine categories), restaurant location, operating hours or payment options. In the following section we will thus employ an econometric model to analyze the *Michelin* effect on the three restaurant quality categories food, service and décor, as well as on restaurant meal prices.

IV. ECONOMETRIC METHODOLOGY

Our econometric analysis relies on three difference-in-differences models, one for each category, i.e., food, service and décor, in order to assess whether the mere inclusion in the *Michelin* guide affected consumer quality assessments. We estimate the following equation:

$$Log(Q_{it}) = \beta_0 + \beta_1 log(Q_{it-1}) + \beta_2 Mich_i + \beta_3 After_t + \beta_4 Mich_i \times After_t + X_{it}\theta + \varepsilon_{it} \qquad (1)$$

where i denotes individual restaurants and t denotes time. Q_t is a measure of quality of food, service or décor, respectively, measured in period t (i.e., 2007); similarly, Q_{t-1} stands for the quality variables in the prior period, i.e., 2004. Introducing the lagged dependent variable accounts for the persistence of quality over time. $Mich_i$ is a dummy variable that takes on the value one if the restaurant was considered in the 2006 *Michelin* guide (first edition) and zero otherwise. *After* is a time dummy that equals one in the period following the introduction of the guide and zero before. $Mich_i \times After_t$ is the interaction term between the two and measures whether Q has changed differently for those who have been introduced in the guide compared to those who have not (control group). It is also known as the difference-in-differences term. X_{it} is a matrix of control variables such as food ethnicity and some characteristics at the restaurant level (accepts credit card, open after 11pm, open on Sundays, limited number of reviews[13]).

It is an implicit assumption in this setup that the treatment, i.e., being considered in the *Michelin* guide, is random and therefore exogenous. Obviously, it is difficult to argue that being considered in the *Michelin* guide is random and independent of the quality of food (or service or décor, respectively) as reported by consumers in the Zagat guide. We, therefore, suspect an endogeneity bias. To remedy this shortcoming we instrument the treatment itself. Given the geographical clustering of *Michelin*-reviewed restaurants, we use the percentage of treated restaurants in the neighborhood as instruments.

The map provided in Figure 2 shows that all *Michelin*-reviewed restaurants are either in one of two geographical clusters in Manhattan or in two less concentrated groups in Queens and Brooklyn.[14] This spatial concentration suggests that the likelihood of being considered in the *Michelin* guide is not independent of a restaurant's geographical location. We exploit this fact and employ a geographical location variable to instrument for being reviewed by the *Michelin* guide.

[Insert Figure 2 here]

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[13] *Zagat* discloses if a restaurant received only a low number of reviews.
[14] Aside from these clusters, there is only one isolated *Michelin*-reviewed restaurant in Forest Hills, Queens.

In addition to the geographical location of the restaurant, we also explore other possible instruments for the *Michelin* treatment. We examine ZIP-code level data of various demographic and economic data that may serve as appropriate instruments for the treatment variable.[15] In particular, we employ size and racial composition of the population, per capita income, population share under the poverty line, share of full-service restaurants as well as the number of wine and liquor stores per capita.

Since almost all *Michelin*-starred restaurants are located in upscale neighborhoods we expect these variables to be valid instruments for the treatment variable. In other words, we assume a direct relation between the regional concentration of *Michelin* restaurants and their environment (wealth/poverty and interest of the local population for fine wine and food). In addition, since all restaurants in the sample were already established when the *Michelin* guide was introduced, the instruments should be exogenous.

As will be shown later, the statistical tests tend to strongly support our intuition and show that our instruments are neither weak nor endogenous.

Defining neighbors and instruments

In order to define neighbors, we identify the geographical coordinates of all restaurants[16] and compute the distance between all pairs of observations. The smallest maximum distance between two restaurants in the dataset is 19.44 miles, the largest minimum distance is 2.11 miles and the general average distance between two restaurants is 3.64 miles.[17] We attribute proximity spatial weights as follows:

$$w_{ij} = \begin{cases} 0 & \text{if } d_{ij} \notin [l_b, u_b] \\ 1/d_{ij}^f & \text{if } d_{ij} \in [l_b, u_b] \end{cases}$$

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[15] There are 176 ZIP codes in New York City.

[16] The coordinates are available in decimal degrees from www.maporama.com and are converted into distances (*Km*) to the equator and to the Greenwich meridian using the formula: $distance = \dfrac{6378.137 \cdot \pi \cdot degrees}{180}$

[17] The maximum distance between two restaurants is little informative since it merely reports the spatial spread of restaurants in New York City. Similarly, the minimum distance is virtually zero for adjacent restaurants. The largest minimum distance gives us an idea of the minimal radius needed for all restaurants to have at least one neighbor. The smallest maximum distance, on the other hand, reflects the spatial spread of restaurants compared to the central restaurant.

where (i,j) denotes a pair of locations, d_{ij} stands for the Euclidean distance between restaurant i and j, l_b and u_b denote the lower and upper bound of the specified distance band, respectively, and f is a positive friction parameter that is set exogenously. The friction parameter determines the rate of devaluation for neighbors compared to the geographic distance. A parameter value of one denotes that the importance of the neighborhood effect is linearly decaying in distance. A friction parameter larger than one suggests that neighborhood effects decline faster than the geographic distance and vice versa.

Since in New York City, the monetary transportation cost is virtually independent of distance traveled while time spent depends on distance, we set the friction parameter equal to 0.8 suggesting below-proportional neighbor depreciations compared to the geographic distance. However, our empirical results are not overly sensitive to different parameter values.

Finally, the values in the weighting matrix are standardized in order to ensure that the sum of all elements per row equals one. A restaurant i is considered a neighbor of restaurant j if the distance between i and j does not exceed 10 km (i.e. $l_b=0$ and $u_b=10$).[18]

We can now easily calculate the average number of *Michelin* restaurants in the neighborhood of each restaurant (weighted by the distance) by multiplying the weighting matrix (W) by the vector identifying the *Michelin* restaurants. In other words, the frequency of "*Michelin* restaurants" in the neighborhood of each restaurant is defined by $W \cdot Mich$ (vector *WMich*). This variable is the first instrument we use for the treatment. The second instrument we consider is a dummy variable that is equal to one if only a small number of customers reviewed the restaurant (*Low2004*); this variable is provided by the Zagat guide. We hypothesize that *Michelin* can afford to disregard unknown restaurants. However, restaurants with a large number of customer reviews may enjoy an increased likelihood of being selected in the guide. Since *Zagat* refers to the number of 2004 reviews, i.e., well before the announcement of the *Michelin* launch, we deem this variable exogenous.

To summarize, the endogenous right hand side variables are *Mich* and *(Mich x After)*. The available instruments are *WMich*, *WMich* interacted with *After* (which is exogenous) and *Low2004*. Since we employ more instruments than we have endogenous variables we test for

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[18] The distance of 10 km was selected to ensure that each restaurant has at least one neighbor.

their redundancy, over-identification (i.e., exogeneity), and weakness. We perform these tests for each model, i.e., for food, décor and service, by drawing on the Hansen J-statistic (exogeneity test), the Kleibergen-Paap rk LM statistic (relevance test) and the Kleibergen-Paap rk Wald F statistic (weakness test).

V. RESULTS

A. Impact on Quality

In Table 4 we report the results of the model described in equation (1) with respect to the quality of food, service and decor. The results of the models using instruments are given in columns (4) to (6). For comparison reasons we also report the result of the simple OLS equations in columns (1) to (3). Note that the treatment variable is specified as a 0-1 dummy variable, i.e., we only distinguish between *reviewed* and *not reviewed*.

[Insert Table 4 here]

As already suggested by Table 1 and 2 and Figure 1, the quality of all three variables increased for all restaurants (see *After*) from 2004 to 2007. Unexpectedly, however, we do not find any significant evidence for the assumption that *Michelin*-reviewed restaurants are of superior quality (see *Michelin*). Although the OLS estimates for the food variable are significant at the 5%-level, all IV estimates are insignificant.

Even more surprising are the estimates for the interaction term (see *Michelin x After*), which denotes the treatment effect. While the OLS models report significant quality improvements for all three variables, the confidence levels decline substantially when referring to the 2SLS models. Only the décor (5%-level) and service (10%-level) variables remain significant. The food variable does not exhibit any *Michelin* treatment-induced quality increase. Although the interaction term is significantly different from zero for all three variables, the largest effect is on décor and service. In general, improved perceived quality can be the result of supply side investments or merely imagined by consumers (demand side). Since we find only *Michelin*-induced perceived service and décor quality improvements but no effects on food quality, we assume that *Michelin*-reviewed restaurant in fact invested in their service and décor.

In Table 5, we report the results of various tests for exogeneity, relevance and weakness of our instruments. Note that we chose different combinations of instruments depending on the resulting test statistics and that we instrument both *Michelin* and *Michelin x After*. The variable "limited number of reviews" refers to a restaurant's (quantitative) unpopularity. The geography variable, as described above, denotes the regional concentration of reviewed restaurants; the number of wine stores, the share of population below the poverty line and the share of full service restaurants are by ZIP code and reflect various aspects of neighborhood desirability.

[Insert Table 5 here]

For the food variable, we calculate the Hansen J-statistic to check for the exogeneity of the instruments. The resulting value of 5.17 is below the critical χ^2 value for three degrees of freedom (7.815). We hence do not reject the null hypothesis that the instruments are exogenous. To check for the relevance of the instruments, we rely on the Kleibergen-Paap rk LM statistic, which equals 39.21 for the food model. This value is well above the critical χ^2 value for four degrees of freedom, which is 9.488. Therefore, we reject the null that the model is underidentified. Finally, to test for the weakness of the set of instruments, we compute the Kleibergen-Paap rk Wald F statistic. The resulting value of 6.797 for the food model is lower (larger) than the critical value of 8.78 (5.91) tabulated by Stock and Yogo (2005) for a 20% (10%) maximal IV relative bias. We find similar results for the service and decor equations.

Table 6 and 7 report the results and instrument statistics when we replace the *Michelin* treatment dummy variable with an ordered variable that takes on the value 0 for not reviewed, 1 for reviewed but no star, 2 for one star, 3 for two stars and 4 for three stars. The ordered variable thus postulates a constant marginal effect of each additional *Michelin* star on the various quality variables. Overall, the results are very similar to the findings when using a treatment dummy variable.

[Insert Table 6 here]

[Insert Table 7 here]

Although our results that an expert guide -- claiming to rate food quality only -- changes

consumers' perception of décor and service but not food quality assessments are somewhat surprising, they are not entirely new. Chossat and Gergaud (2003) and Gergaud et al. (2007) show that *Michelin* evaluations in France are not solely driven by food quality but also influenced by non-food characteristics such as décor and service. Johnson and Surlemot (2005) interviewed chef-owners of *Michelin* starred restaurants in France, Belgium, Switzerland and the UK and report that receiving a *Michelin* star places enormous pressure on the owner. Massive efforts and investments are due in order to retain the recently gained (first, second or third) *Michelin* star. Since these investments include service and décor it seems to be commonly understood among restaurateurs that *Michelin* ratings – in contrast to their claim - are influenced by service and décor. These findings suggest that the higher service and décor quality may not be imagined by consumers but may rather be the result of the owner's effort.

Investments in service and décor are expensive and may only be justified if they yield higher revenue. There is some anecdotal evidence that *Michelin* stars demand a premium and are thus worth being retained. Eric Ripert, chef and owner of *Le Bernardin*, one of only three New York City restaurants that received three *Michelin* stars in 2006, reports revenue increases of at least 15% (Davis, 2012). Johnson and Surlemot (2005) find similar values for European *Michelin* starred venues. In an analysis of French *Michelin* reviewed restaurants from 1970 to 1994 Snyder and Cotter (1998) find a close relationship between investments, especially in ambience, *Michelin* stars and prices. In particular, the loss of a *Michelin* star is often predated by receding investments and lower prices.

B. Impact on Prices

In Table 8 we show the impact of the *Michelin* treatment (i.e., being included in the Guide) on menu prices. The model specification is identical with the one for the *Zagat* quality assessments (see equation 2); we only substituted the logarithm of menu prices for the *Zagat* variable as dependent variable. Exogeneity, under identification and weak identification tests for the selected instruments are reported in Table 9. Accordingly, when employing a simple 1-0 dummy variable for the inclusion in the *Michelin Guide* we find treatment-induced price increases of approximately 37%. When using an ordered 0-1-2-3-4 treatment variable we find a marginal effect of 0.22. That is, one *Michelin* star yields an approximate price premium of 44% while three stars will cause price increases of about 88%.

[Insert Table 8 here]

[Insert Table 9 here]

We are further interested in examining whether these price increases are related to food, service or décor quality improvements and whether there is a difference between *Michelin*-reviewed and un-reviewed restaurants. We select all unique restaurants for which we have price and quality data for 2004 and 2007 and regress the nominal price difference on the respective quality difference and a constant term. In this fashion we ran 12 different regressions; Table 10 displays the results. In the Columns denoted "All" we draw on 700 un-reviewed and 338 reviewed restaurants. For the group of un-reviewed restaurants we find positive marginal effects of food, service and décor quality changes. However, only décor changes exert a modestly significant effect on price changes; the other quality variables remain insignificant. In contrast, the prices of *Michelin*-reviewed respond to service and décor changes at the 1% and 2% significance level, respectively. In addition, the marginal effects for *Michelin*-treated restaurants are between three times (décor) and 8.5 times (service) larger than for un-treated restaurants. These effects are remarkable given that the average price difference between treated an untreated restaurant was only 38% in 2004 (see Table 1). In contrast, food quality improvements do not seem to trigger any price increases.

[Insert Table 10 here]

These results suggest that *Michelin*-treated restaurants improve the quality of their service and décor but not the quality of their food in order to raise prices. On the other hand, prices of untreated restaurants are only weakly driven by décor improvements.

However, when regressing price changes only on changes in one quality dimension, we disregard possible changes in the other quality variables and may just confound the respective marginal effects. We, therefore, restrict our sample to only these restaurants that exhibited a change in only one quality variable. For instance, when regressing price changes on food quality changes, we only refer to restaurants for which décor and service has not changed by more than one Zagat quality point. While this procedure allows us to isolate the respective quality effects on prices, our sample size now drops to between 439 and 473 for untreated and between 239 and 252 for *Michelin*-treated restaurants. The corresponding results, as reported in the Columns denoted "Restricted Sample" in Table 10, confirm our prior findings, although

at a somewhat lower significance level. On the one hand, price changes of restaurants that have not been reviewed by the *Michelin* guide are determined by food quality changes; service and décor improvement are irrelevant. On the other hand, menu price increases of *Michelin*-reviewed restaurants are fully determined by service and décor quality and completely detached from food quality changes.

Figure 3 shows the scatterplots and local polynomial smooths for the restricted data samples, i.e., when keeping the other quality variables virtually constant. The three left-hand columns report the price-quality change relationships for *Michelin* restaurants. While even 3 Zagat-point food improvements have not yielded any price increases, the returns to larger service improvements have been substantial. For un-reviewed restaurants, reported in the three columns on the right-hand, the opposite is true. While food quality improvements have translated into higher menu prices, even significant service and décor improvements have not paid off.

<div align="center">[Insert Figure 3 here]</div>

Against this background, one needs to keep in mind that the *Michelin* guide claims to only assess a restaurant's food quality and disregards its service and décor. Our results suggest that food expert reviews initiate service and décor improvements leading to higher prices and thus exerting negative external effects for gourmets.

VII. SUMMARY AND CONCLUSIONS

In this paper we analyze whether consumers' quality perception is influenced by newly appearing expert opinion. We investigate this question by referring to restaurants in New York City and exploiting a natural experiment. As the leading restaurant guide *Zagat* has rated New York City's restaurants since 1979 by surveying more than 30,000 restaurant goers per year. In 2005, with the first release of the red *Michelin Guide New York City*, *Zagat* faced a serious competition. In contrast to *Zagat*, *Michelin* relies on expert eaters. Employing a difference-in-differences approach we analyze whether consumer assessments (*Zagat* ratings) have responded to *Michelin* quality assessments. While we surprisingly do not find any significant *Michelin*-induced increase in perceived food quality, being *Michelin*-reviewed exerts significantly positive effects on service and décor quality. We assume that the service

and décor effects are not imagined but rather based on real restaurant investments. This conjecture is in line with the idea that improving food quality usually takes more time and is a more complicated (because artistic) task than improving décor that just requires instant investments in renovations and/or improving service hiring more and/or better waiters.

We find that the inclusion in the *Michelin* guide induced substantial price increases. While restaurants that were not *Michelin*-reviewed can raise their prices in response to food quality improvements, service and décor improvement do not payoff. In contrast, *Michelin*-reviewed restaurant, on the other hand, enjoy substantial returns only to service and décor improvement. Our results suggest that expert opinion on the New York City restaurant market exerts a negative externality on gourmet by giving restaurants incentives to invest in service and décor leading to higher prices for the same food.

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Table 1

Descriptive Statistics for Zagat Food, Service, Décor Ratings and Price

2004 and 2007, by Reviewed and Unreviewed

	Number of observations	Mean	Std. Deviation	Minimum	Maximum
			Food		
2004 all	1497	20.46	2.82	9	28
2007 all	1516	20.97	2.58	10	29
2007 unreviewed	1047	20.28	2.34	10	29
2007 reviewed	469	22.52	2.43	16	28
			Service		
2004 all	1497	18.20	3.17	8	30
2007 all	1518	18.47	3.08	8	29
2007 unreviewed	1049	17.75	2.84	8	29
2007 reviewed	469	20.07	2.99	10	29
			Décor		
2004 all	1494	16.64	4.56	2	28
2007 all	1517	16.79	4.50	3	29
2007 unreviewed	1049	15.74	4.28	3	29
2007 Michelin reviewed	468	19.14	4.07	5	28
			Price		
2004 all	1497	38.14	14.94	5	185
2007 all	1515	40.69	20.64	5	446
2007 unreviewed	1048	35.60	14.52	5	215
2007 Michelin reviewed	467	52.12	26.85	14	446

Source: Zagat Survey (2003 and 2006).

Table 2

Descriptive Statistics Food, Service and Décor Quality and Price

Treatment and Non-Treatment Group 2004 and 2007

	Number of observations	Mean	Std. Dev. (CV in %)	Minimum	Maximum
		Food			
Non-Treatment 2004	1109	19.72	2.55 (12.9)	9	28
Non-Treatment 2007	1002	20.20	2.34 (11.6)	10	29
Treatment 2004	388	22.59	2.44 (10.8)	15	28
Treatment 2007	514	22.47	2.38 (10.6)	16	28
		Service			
Non-Treatment 2004	1109	17.53	2.96 (16.9)	8	30
Non-Treatment 2007	1003	17.60	2.78 (15.8)	8	29
Treatment 2004	388	20.12	2.98 (14.8)	10	27
Treatment 2007	515	20.14	2.96 (14.7)	10	29
		Décor			
Non-Treatment 2004	1106	15.84	4.38 (27.7)	2	28
Non-Treatment 2007	1003	15.62	4.24 (27.1)	3	29
Treatment 2004	338	18.94	4.28 (22.6)	5	28
Treatment 2007	514	19.07	4.11 (21.6)	4	28
		Price			
Non-Treatment 2004	1109	34.70	12.73 (36.7)	5	93
Non-Treatment 2007	1002	34.86	12.77 (36.6)	5	85
Treatment 2004	388	47.99	16.38 (34.1)	16	185
Treatment 2007	513	52.08	27.28 (52.4)	14	446

Source: Zagat Restaurant Guide New York City, 2004 and 2007.

Table 3
Percentage Change in Quality and Price from 2004 to 2007
Treatment and Non-Treatment Group

		Change
Food	Non-Treatment	2.43%
	Treatment	-0.53%
Service	Non-Treatment	0.40%
	Treatment	0.10%
Décor	Non-Treatment	-1.39%
	Treatment	0.69%
Price	Non-Treatment	0.46%
	Treatment	8.52%

Table 4
Perceived Quality Difference-in-Difference Equations
Dependent variable: Log of perceived quality; Treatment : Michelin 2006 (dummy)

	OLS			2SLS		
	(1)	(2)	(3)	(4)	(5)	(6)
	Food	Décor	Service	Food	Décor	Service
Michelin	0.00**	0.00	0.00	0.01	-0.02	-0.00
	(2.15)	(0.51)	(0.57)	(1.43)	(-0.57)	(-0.42)
Michelin x After	0.10***	0.18***	0.12***	0.04	0.29**	0.11*
	(16.20)	(12.76)	(13.64)	(0.79)	(2.48)	(1.65)
After	2.88***	2.44***	2.58***	2.86***	2.50***	2.62***
	(147.46)	(60.66)	(82.16)	(66.66)	(52.04)	(62.37)
Lagged Dependent (2004)	0.96***	0.90***	0.90***	0.94***	0.92***	0.91***
	(152.54)	(66.46)	(84.01)	(65.36)	(51.79)	(54.41)
Open after 11 PM	-0.02***	-0.00	-0.03***	-0.02***	0.01	-0.03***
	(-5.40)	(-0.10)	(-5.41)	(-5.40)	(1.20)	(-4.69)
No Credit Cards Accepted	0.02***	-0.16***	-0.06***	0.02**	-0.16***	-0.07***
	(4.45)	(-7.89)	(-6.87)	(2.47)	(-6.35)	(-5.59)
Closed on Sunday	-0.03***	-0.03***	-0.04***	-0.03***	-0.02	-0.04***
	(-6.11)	(-2.73)	(-6.25)	(-4.70)	(-1.27)	(-5.22)
Limited # of reviews (2004)	-0.00**	-0.00	-0.00			
	(-2.51)	(-0.35)	(-0.46)			
Constant	0.17***	0.28***	0.34***	0.22***	0.21***	0.31***
	(7.03)	(6.10)	(9.44)	(4.58)	(3.60)	(5.72)
Food ethnicity fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3012	3010	3014	2475	2473	2498
R-squared	0.65	0.61	0.57	0.64	0.60	0.56

Dependent variable: ln of perceived quality; Treatment: Not in Michelin = 0 ; In Michelin = 1.
Robust z-statistics in parentheses; z-statistics are based on restaurant-clustered standard errors;
*** p < 0.01, ** p < 0.05, * p < 0.1 ;

Table 5
Exogeneity, Under Identification and Weak Identification Tests

	Food (4)	Décor (5)	Service (6)
Under identification test :			
Kleibergen-Paap rk (LM statistic)	39.205	32.547	35.508
	(0.000)	(0.000)	(0.000)
Weak identification test :			
Kleibergen-Paap stat.	6.797	6.523	8.199
IV Relative bias	10-20%	10-20%	5-10%
Exogeneity of instruments :			
Hansen's overidentification test	5.169	2.649	4.675
	(0.160)	(0.266)	(0.097)
Instruments:			
Limited reviews	Yes	Yes	Yes
Geography	Yes	Yes	Yes
Wine stores	Yes	No	No
Poverty share	Yes	Yes	No
Proportion of full service rest.	No	No	Yes

Table 6
Perceived Quality Equations (Difference-in-differences) for Ordered Treatment
Dependent variable: Log of perceived quality; Treatment : Michelin 2006 (ordered)

	OLS			2SLS		
	(1)	(2)	(3)	(4)	(5)	(6)
	Food	Décor	Service	Food	Décor	Service
Michelin	0.00**	0.00	0.00	0.01	-0.01	-0.00
	(2.37)	(0.55)	(0.58)	(1.41)	(-0.47)	(-0.42)
Michelin x After	0.09***	0.16***	0.11***	0.02	0.24**	0.09*
	(19.52)	(14.83)	(16.64)	(0.66)	(2.49)	(1.65)
After	2.88***	2.45***	2.58***	2.86***	2.50***	2.62***
	(151.28)	(61.15)	(84.11)	(67.42)	(52.85)	(62.51)
Lagged Dependent (2004)	0.96***	0.90***	0.90***	0.94***	0.92***	0.91***
	(156.20)	(66.98)	(86.02)	(65.47)	(51.68)	(53.95)
Open after 11 PM	-0.02***	-0.00	-0.03***	-0.02***	0.01	-0.03***
	(-5.45)	(-0.10)	(-5.41)	(-5.62)	(1.15)	(-4.89)
No Credit Cards Accepted	0.02***	-0.16***	-0.06***	0.02**	-0.16***	-0.07***
	(4.49)	(-7.91)	(-6.87)	(2.45)	(-6.51)	(-5.74)
Closed on Sunday	-0.02***	-0.03**	-0.04***	-0.02***	-0.01	-0.04***
Limited # of reviews (2004)	-0.00**	-0.00	-0.00	-	-	-
	(-2.40)	(-0.32)	(-0.48)	-	-	-
Constant	0.17***	0.28***	0.33***	0.22***	0.21***	0.31***
	(7.06)	(6.02)	(9.34)	(4.57)	(3.59)	(5.66)
Food ethnicity fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3012	3010	3014	2475	2473	2498
R-squared	0.66	0.61	0.58	0.64	0.61	0.57

Robust z-statistics in parentheses; z-statistics are based on restaurant-clustered standard errors; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; Treatment : 0 = not in Michelin ; 1 = in Michelin ; 2 = one star ; 3 = two stars ; 4 = three stars.

Table 7
**Exogeneity, Under Identification and Weak Identification Tests**

	Food (4)	Décor (5)	Service (6)
Under identification test :			
Kleibergen-Paap rk (LM statistic)	38.035	32.688	35.025
	(0.000)	(0.000)	(0.000)
Weak identification test :			
Kleibergen-Paap stat.	7.191	6.871	8.549
IV Relative bias	10-20%	10-20%	5-10%
Exogeneity of instruments :			
Hansen's overidentification test	5.584	2.489	4.757
	(0.134)	(0.288)	(0.093)
Instruments:			
Limited reviews	Yes	Yes	Yes
Geography	Yes	Yes	Yes
Wine stores	Yes	No	No
Poverty share	Yes	Yes	No
Proportion of full service rest.	No	No	Yes

Table 8
Difference-in-Differences Price Equations
Treatment: Michelin 2006 (dummy and ordered)

	Treatment	
	Dummy	**Ordered**
Michelin	0.52***	0.51***
	(4.43)	(4.43)
Michelin × After	0.37**	0.22
	(2.25)	(1.46)
After	-.06	-0.05
	(-1.33)	(-1.03)
Open after 11 PM	0.02	0.01
	(0.74)	(0.69)
No Credit Cards Accept	-0.37***	-0.38***
	(9.99)	(-10.54)
Closed on Sunday	-0.16***	-0.15**
	(5.52)	(-4.71)
Constant	3.60***	3.61***
	(51.85)	(54.92)
Food origin dummies	Yes	Yes
Observations	2476	2476
R-squared	0.12	0.17

Dependent variable: ln of price; Robust z-statistics in parentheses; z-statistics are based on restaurant-clustered standard errors; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; *** $p < 0.01$, ** $p < 0.05$;
Treatment: 0 = not in Michelin; 1 = in Michelin, no star; 2 = one star; 3 = two stars; 4 = three stars.

Table 9
Exogeneity, Under Identification and Weak Identification Tests
(Price equations)

	Dummy	Ordered
Under identification test :		
Kleibergen-Paap rk (LM statistic)	38.020	34.123
	(0.000)	(0.000)
Weak identification test :		
Kleibergen-Paap stat.	7.927	7.740
IV Relative bias	5-10%	5-10%
Exogeneity of instruments :		
Hansen's overidentification test	2.010	2.826
	(0.366)	(0.243)
Instruments:		
Limited reviews	Yes	Yes
Geography	Yes	Yes
Wine stores	Yes	No
Poverty share	No	No
Proportion of full service rest.	No	No

Table 10
Determinants of Price Changes
Dependent Variable: Nominal Price Change from 2004 to 2007

	Not Michelin Reviewed		Michelin Reviewed	
	All	Restricted Sample[a]	All	Restricted Sample[a]
Change in Food Quality	0.0139 (700; 0.18)	0.1966+ (439; 1.85)	0.2301 (338; 1.01)	-0.2310 (239; -0.88)
Change in Décor Quality	0.1207+ (700; 1.75)	0.0143 (473; 0.19)	0.3612** (338; 2.45)	0.3015+ (252; 1.90)
Change in Service Quality	0.0491 (700; 0.57)	0.1415 (451; 1.41)	0.4189*** (338; 2.58)	0.3645+ (240; 1.72)

All equations contain a constant term (not reported here); number of observations and robust t-statistics in parentheses (n; t-stats). Significance + (6%), * (5%), ** (2%), *** (1%). [a]) Sample is restricted to observations with quality changes of one or less Zagat point for the other quality variables. For instance, the impact of food quality changes is measured for restaurants that have not changed the service and decor quality by more than one point up or down.

Figure 1
Kernel Density Function for Food and Price 2004 and 2007
Treatment and Non-Treatment Group
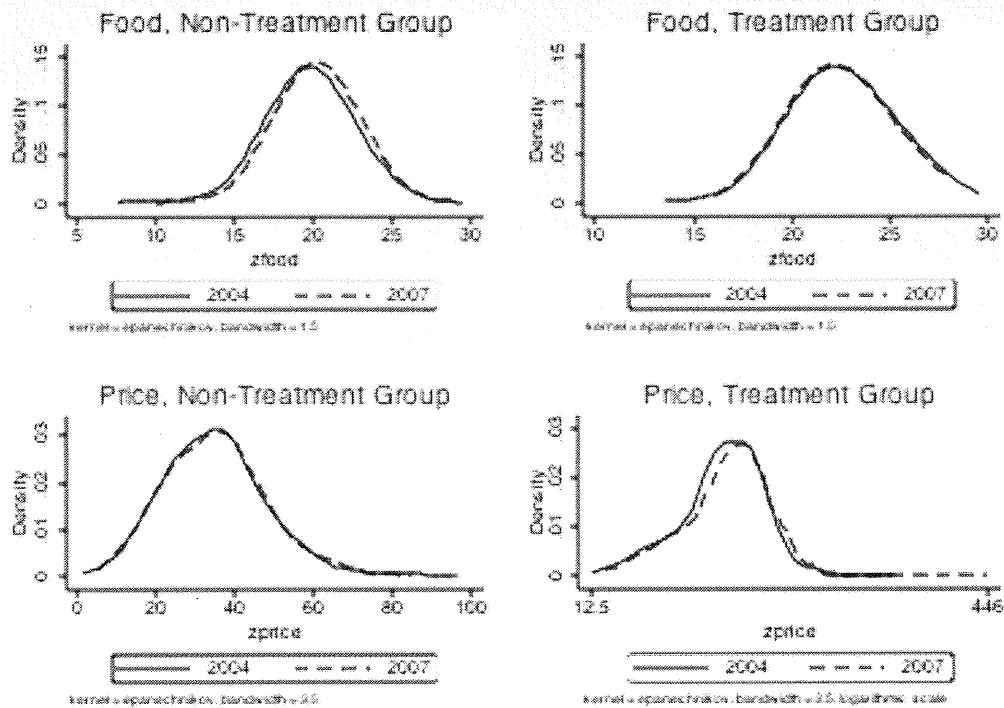
Figure 2
Michelin Restaurants in New York City
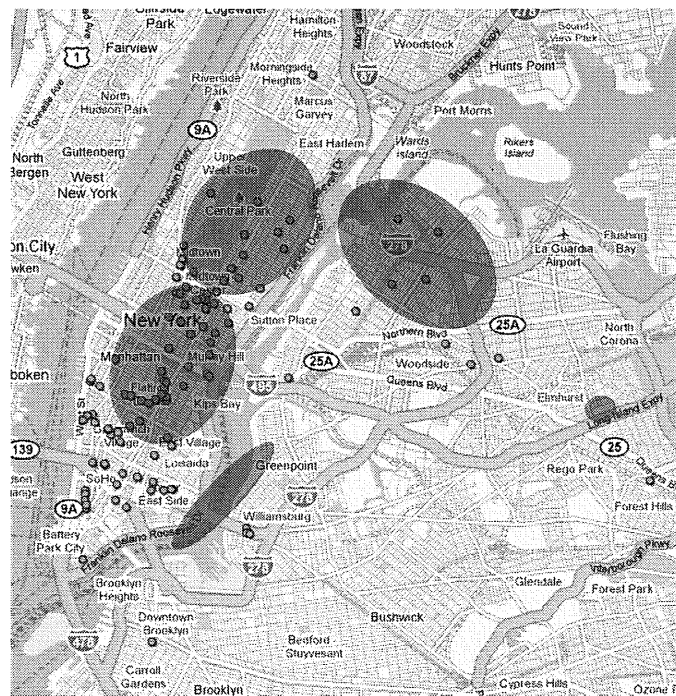
Figure 3
Quality and Price Changes 2004 to 2007
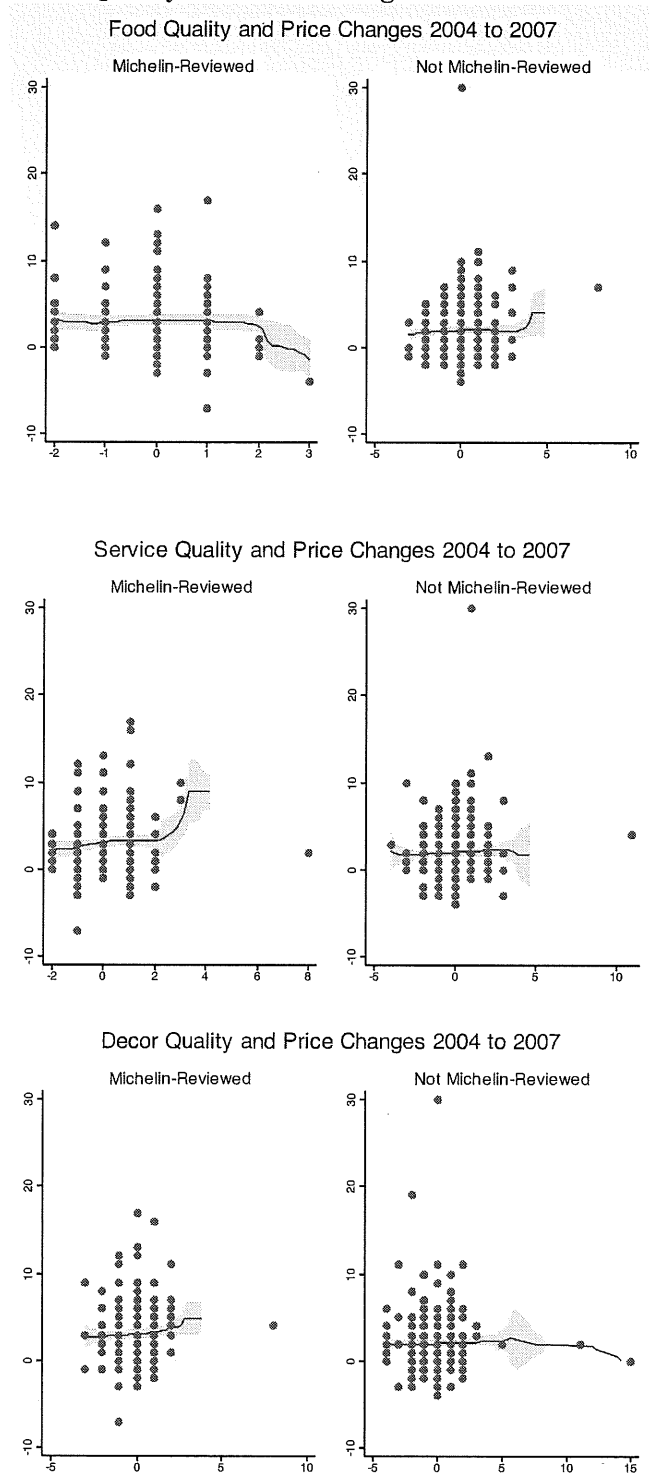
Price change in US$ (y-axis) and quality change in Zagat points (x-axis); Observations refer to restricted sample, i.e., when changes in the other quality variables are one or less (see text); the fitted line is the local polynomial smooth with the 95% confidence interval.

Exhibit 4

Document 1 of 1

Price signaling: Does it ever work?

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ProQuest document link

Abstract: The phenomenon of price signaling, whereby consumer goods manufacturers attempt to signal quality via a higher price when objective product quality is, in fact, not demonstrably superior, is examined. A study of 2 similar facial moisturizers, Estee Lauder's Future Perfect and Ultima II's Megadose, showed that higher price alone did not succeed in signaling higher quality, but that higher price accompanied by premium-quality signals in the other elements of the marketing mix (advertising, packaging, in-store location) does succeed. More generally, a premium pricing strategy cannot be successful if price is the only marketing variable emphasized. Brand managers should therefore think in terms of a premium quality positioning that requires the application of quality cues across the marketing mix.

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Full text: Since 1945, when Scitovsky first introduced the topic, numerous researchers have investigated the relationship between price and consumers' perception of product quality (Monroe and Dodds, 1988). However, the relationship between price and objective product quality has received less attention from researchers; moreover, the empirical evidence which does exist presents an ambiguous picture (Monroe and Dodds, 1988). For example, a study correlating Consumer Reports quality ratings with brand prices found significant variation in both the strength and the direction of the relationship between price and objective product quality (Gerstner, 1985). Results such as this have led some to conclude that, overall, price is only weakly correlated with objective product quality. An inescapable conclusion from these studies is that higher price does not always reflect superior product quality.

What explains these counterintuitive findings? One interpretation is that, given similar cost structures, some producers seem to set prices artificially high to suggest a higher level of product quality than actually exists. This approach assumes that certain consumer segments are either unwilling or unable to find more objective indicators of quality. Hence, this practice, called price signaling (Tellis, 1986), represents a conscious effort by manufacturers to use price as a "surrogate indicator" of superior quality when relative quality is not commensurate with the price. Note that this definition of price signaling refers only to cases where the high price is not supported by a higher-quality product. Thus, the issue is this: How can higher perceived quality be effectively communicated and sustained when objective quality is only at parity with other brands? Price signaling via premium pricing is one conventional approach for accomplishing this.

Certainly price signaling does not always succeed. Under what conditions does it succeed? Clearly, it cannot succeed when product quality is easily discernible. For example, buyers of personal computers can examine objective measures such as microprocessor speed, amount of memory, and type of monitor. The tangible nature of the computer allows for efficient comparison of salient features. But consider where the case of most services and less tangible products, quality is not so easily assessable. We will examine the proposition that the success or failure of price signaling under these conditions depends on the consistency of marketing cues other than price such as advertising appeal and package design.

Several examples of successful product launches point to the effectiveness of a price signaling strategy when other elements of the marketing mix supplement a premium pricing strategy. For instance:

* The 1984, Pontiac Fiero sold moderately well for General Motors. Unfortunately, the automobile had a tendency to catch fire, an inherent safety and reliability problem. Exposure of this problem raised questions

among knowledgeable consumers about the quality of the automobile's overall design and workmanship. The car, however, continued to sell well by using sharp image appeals, even after initial disclosure of the problems. General Motors eventually discontinued production of the car in 1988.

* In 1971, Clorox introduced a cat box filler with only modest improvements over the leading brand. Priced 250 per cent higher than competitors and backed by an advertisement campaign that emphasized its quality features, the product quickly stole market share from competitors. The product itself was not fundamentally different from its competing products, but its higher price, upscale advertising appeal, and attractive packaging apparently convinced many cat owners that the product was superior to its competitors. The product eventually failed because cats apparently did not share their owners' enthusiasm for the brand.

An intriguing issue is how price signaling can be effective over the long run. The economics "theory of lemons" predicts that uncertain quality coupled with the potential for price signaling causes the demand for high priced products to fall apart (Akerlof, 1970). Sellers have an incentive to set prices higher than they know are warranted by the product quality if there are no market mechanisms (e.g. Consumer Reports) to present relevant information to buyers. Buyers unable to determine quality before purchase will tend to reduce the price they are willing to pay out of fear of obtaining a "lemon". The pricing of used cars is a classic example of this theory.

However, this view assumes that consumers have no means of acquiring information about quality. In reality, most consumers can obtain such information, although at a cost of time or money. If this assumption is relaxed some price signaling can exist without causing the market for high-quality products to fall apart (Tellis and Wemerfelt, 1987). However, why price signaling succeeds for some brands and not others under the same quality uncertainty condition (i.e., within the same product category) remains uncertain. More to the point, what strategic marketing elements help to distinguish price signalers who succeed, from those who fail?

The marketing literature has focussed largely on the relationship between price and quality, to the exclusion of the marketing mix elements. This is a major oversight because advertising, packaging, and brand name reputation have been shown to play an important role in consumer evaluation of quality (Monroe and Dodds, 1988). For example, it has been shown that cues for physical differences and store image render price an insignificant indicator of product quality (Szybillo and Jacoby, 1974). Apparently, the extent to which price is used as a quality signal depends on the availability of alternative information. One would expect sellers of high-priced products to supplement their price cues with these alternative cues. In markets where other sellers do offer alternative cues, it would appear that a price signaler needs to mimic these alternative cues to succeed. Therefore, one condition for the success of price signaling is to have all elements of the marketing mix signal equivalent quality levels.

Our hypothesis is that price signaling will prove successful only when multiple quality cues consistently signal quality.

There are several additional benefits to studying price signaling. First, from a consumer's perspective, understanding the complex nature of the price signaling phenomenon can give marketers a richer understanding of how other marketing stimuli interact with price and quality perceptions. Second, firms competing against companies which practice price signaling could also benefit from an understanding of this relationship. Third, public policy makers could benefit from a better understanding of price signaling as it pertains to unfair or deceptive marketing practices.

Using an in-depth case study in the cosmetic industry, we attempt to outline the factors which support the successful use of the price signaling tactic. Specifically, we will examine the case of skin moisturizers where brand differentiation and positioning are essential for success. The goal is to explain how a successful cosmetic brand, Future Perfect (manufactured by Estee Lauder), has built a quality image by utilizing "extrinsic cues"--such as upscale packaging and advertising appeal, exclusive distribution, and strong brand name appeal--to support its higher prices, while conversely, Megadose (manufactured by Ultima II), attempting to employ similar

tactics, experienced disappointing sales results. Results of this analysis are used to suggest the consumer, competitive, and ethical implications of price signaling as a common marketing practice.

CASE RESEARCH DESIGN

A case research approach was used to examine the possible relationship between the consistent use of multiple quality cues and the success of price signaling. Case research allows for a more natural, in-context study of the interplay of multiple factors; a form of "natural experiment", as opposed to a laboratory experiment (Bonoma, 1985; Lee, 1989; Monroe and Dodds, 1988). Two brands of skin moisturizers were evaluated with respect to price signaling practices. Table I provides a description of the brands, their manufacturer, and date of market entry. (Table I omitted)

Skin moisturizers were selected as the focal point of this case study because:

(1) a visual inspection of product quality is difficult (i.e. the product possesses many intangible attributes);

(2) the high perceived social risk of unattractive facial appearance involved in purchasing skin care products necessitates a close inspection of surrogate quality cues; and

(3) significant price variation among brands within the product market suggests that some degree of price signaling might occur.

Several extrinsic cues of brand quality were examined. Initially, this study attempted to establish objective brand quality by consulting industry sources such as Consumer Reports, interviewing three independent cosmetic chemists, and perusing the business press. Second, a convenience sample (with in-depth interviews) was conducted with 38 female subjects to gauge their reactions to both advertising copy and package design for the two brands.

Sub-samples of the original group subsequently examined advertising copy for one of the brands and made judgments on the brand's overall quality as well as the brand's possession of certain attributes. The same procedure was conducted with respect to each brand's package design. Each of the subsamples viewed only one product's advertisement copy and packaging to avoid prior exposure biasing their reaction. Finally, brand name reputation as well as the effectiveness of display location within retail establishments were analyzed through the use of trade and industry information and interviews with retail managers and salespersons.

PRICE/QUALITY ASSESSMENT

The price position for both Future Perfect and Megadose suggests superior quality. At $25.10 and $24.20 an ounce respectively, these two brands of moisturizer charge a steep premium over other mass-marketed brands. Table II provides a sample of moisturizer prices, demonstrating the wide range in this market. (Table II omitted) To determine whether Future Perfect and Megadose warrant their high price or have simply employed the price signaling tactic, the objective quality of these brands was assessed. One difficulty in achieving this objectivity is the fact that different evaluators--consumers, managers, and researchers--use vastly different criteria, such as manufacturing expertise, purity of ingredients, or direct benefits to users. In essence, a single indicator of quality does not capture the entirety of this dimension. Therefore, several measures of quality were used in the study. By using names reminiscent of medicine and youthful skin, and charging high prices compared with other mass marketed brands, Estee Lauder and Ultima II imply that the use of Future Perfect and Megadose will result in superior benefits for the skin. However, scant evidence supports the notion that these products have either anti-aging or medical properties. Indeed, Consumer Reports (1986) found that "the cheaper, plainer moisturizers often did the best job on skin Another analysis found that high-priced skin moisturizers "do little more than prevent moisture from evaporating from the skin, a feat also accomplished by smearing on a little Vaseline" (Benway, 1986). Four cosmetics managers and analysts interviewed for this study agreed that high-priced moisturizers show little superiority over their lower-priced competitors. In addition, a panel of three chemists not associated with any cosmetics firm was asked to evaluate further the quality of these two brands, and they found no major difference in their ingredients or probable effectiveness compared with lower-priced competitors although Future Perfect and Megadose might provide "a better feel" for some consumers.

The business and consumer press, industry experts, and laboratory chemists, then, all agreed that there are no significant quality differences between the high-priced and low-priced moisturizers. Overall, the evidence suggests that these products are priced considerably above their relative quality level. Both Future Perfect and Megadose seem to practice at least some form of price signaling as it is defined here.

To address the question of "why Future Perfect was more successful than Megadose", four other, surrogate indicators of quality--advertising appeal, package design, brand name reputation, and in-store display characteristics--were investigated relative to their impact on quality perceptions. Marketers can at least partially control their advertising, packaging, and brand name appeal to communicate quality. Academicians as well as the business press support the linkage between each of these cues and perceived quality (Zeithaml, 1988). Generally, their impact on quality perceptions entails two facets: dollar investment in the cue, and the quality appeal of the message. Therefore, according to our hypothesis, successful price signallers will perform above average on these dimensions of all controllable quality cues.

ADVERTISING AS A QUALITY CUE

Advertising can affect perceived quality in at least two ways: the relative amount of advertising, and the embedded quality appeals (Murphy, 1987). Estee Lauder made a greater investment in Future Perfect's advertising, as evidenced by amount of exposure, than Ultima II invested in Megadose's advertising. A review of ten upscale women's fashion magazines (e.g. Glamour, Mademoiselle, Vogue) from 1988 through 1990 found that advertisements for Future Perfect appeared roughly twice as often as those for Megadose in their respective years of introduction. Moreover, Estee Lauder promoted Future Perfect with two-page advertisements well beyond its introduction, whereas Ultima II initially advertised Megadose with only a one-page copy.

The strength of the quality appeals in the advertising also differed for the two brands. Using powerful images of space and high technology, advertising for Future Perfect suggests that the product will make a noticeable difference in a consumer's skin. Visually, Future Perfect's advertising shows a model clad in a space suit with strikingly beautiful skin while the product is pictured orbiting the earth. With crisp blues and silvers throughout, the advertisements symbolically suggest advanced technology which produces remarkable results. The copy reinforces and complements this quality image: proclaiming "The Past Forgiven, The Present Forgot, The Future Perfect", the lead copy hints at a possible reversal of aging. Coined scientific terms such as "targeted microsomes" as well as prominent use of "Estee Lauder Laboratories" conjure up images of medicine and scientific breakthrough.

In contrast, the advertising for Megadose does not present a convincing quality message. The visuals are minimalist, presenting a closeup of the product on a black background while the copy simply states "Megadose: Sleep on It". Visually, verbally, and symbolically this advertising does not suggest superior quality. Similarly, the Megadose advertisement provides no indication that the brand possesses quality attributes such as pure ingredients, or that it has the ability to slow wrinkles. It should also be noted that in a previous study consumers did find three--and four-color messages (such as Future Perfect's) superior and more expensive looking than the two-color messages used by Ultima II (Shank, 1990).

A survey and in-depth interviews were conducted to probe women's reactions to these advertisements. First, ten leading fashion magazines were content analyzed to generate a list of the most prominent attributes cited to promote skin moisturizers. These attributes included making skin soft, fighting wrinkles, using pure ingredients, using high technology in producing the moisturizer, and keeping moisture in skin. Next, a sample of 38 female subjects was used to obtain an overall quality rating for each brand and to determine whether a particular attribute was suggested by the advertisement. The sample was split into equal sub-samples (ultimately 20 in one and 18 in the other, since two had to drop out). The sub-sample of 18 evaluated the advertisements for Future Perfect and the packaging for Megadose, while the sub-sample of 20 evaluated the Megadose advertisements and the Future Perfect packaging. This approach was used to eliminate the interactive effects of

exposure to both advertisements and package design of a single brand. Though there may be some testing effect from not having four randomized groups, we believe the risk is small and justified for several reasons: the study's purpose was exploratory in nature; this is a case study using multiple data sources and not solely a survey research; it is not unnatural for women to have seen advertisements for other brands; and the possible testing effect is likely to be small compared with the magnitude of the main effect.

Table III outlines the results of the advertisement exposures. (Table III omitted) Future Perfect received a significantly higher overall quality rating than Megadose (p >0.01). In addition, a significantly higher proportion of the respondents thought Future Perfect possessed each of the listed quality attributes (p >0.01). Despite the small sample size, there were marked differences between the perception of quality perceptions of each brand's advertisements.

In follow-up interviews, respondents were asked what characteristics of the advertisements most influenced their ratings. Several of them noted the amount of advertisement copy for the product--the extensive amount for Future Perfect praised, the one line for Megadose criticized. Moreover, some respondents associated the use of black-and-white copy in the Megadose as an indication of inferiority. These findings indicate that the disparity in the overall rating of the brands is associated with differences in the advertisements' possession of certain characteristics. Furthermore, these differences point to possible inconsistencies between the Megadose pricing strategy and the execution of its advertising strategy.

PACKAGING AS A QUALITY CUE

Packaging can create or reinforce a quality image with either costly materials or a design suggestive of quality. In the case of cosmetics, glass jars (especially frosted glass) and high-tech pumps not only catch the consumer's attention, but may also signal quality. Both moisturizers are packaged in glass--Future Perfect in a high-tech glass pump and Megadose in a glass jar. Both companies invested in materials designed to signal quality to consumers. In addition, Future Perfect uses hard, gray plastic on both the top and bottom of the glass pump.

Packaging design can also incorporate quality appeals. Clear glass which allows viewing of the product's features, the use of colors, superior typeface, and brand name can increase the quality appeal of a product's packaging. Future Perfect uses all of these characteristics in its packaging. The clear glass pump reveals the blue flecked moisturizer within, creating a color scheme of gray, cool blue, and specks of white and bright blue. A gold, elegant type is used on the packaging for both the product and brand name. Future Perfect's packaging supports the modern, hi-tech image created in the advertisements.

Ultima II's packaging for Megadose also allows viewing of the moisturizer, a clear gel with white balls of moisturizer. Encased in a black plastic lid, the product looks advanced, scientific, and extremely futuristic. The packaging repeats two elements used in the Megadose advertising--the black-and-white color scheme and the absence of the Ultima II name.

On the basis of the package design, as with the advertisements, respondents were asked to rate the overall quality of the brand as well as the brand's possession of certain attributes. Here too, Future Perfect received a significantly higher overall quality rating than Megadose (p <0.01). Also, each attribute, except "us of high technology" was perceived to be associated more with Future Perfect than with Megadose (p <0.01). The quality rating for Megadose increased slightly, and the percentage who thought the brand used high technology climbed above 50 per cent. Nevertheless, Megadose's quality was perceived to be inferior to that of Future Perfect on all attributes for dimension. Table IV shows the results. (Table IV omitted)

In follow-up interviews, respondents explained why they reacted so negatively to the appearance of Megadose. The moisturizer itself apparently created a "scientific fiction" image which was not appealing to the female subjects. The white balls floating symmetrically throughout the clear gel invoked such comments as "alien eggs waiting to hatch" and "test tube experiments in a bottle On the other hand, respondents reacted favorably to Future Perfect's packaging, especially the blue color, the use of flecks in the moisturizer, and the high-tech

pump. However, respondents indicated that the (cheap-looking) plastic trim detracted somewhat from the quality appeal of the package.

BRAND NAME AS A QUALITY CUE

The effectiveness of price signaling relative to the brand name quality cue depends in part on past strategies such as consistently positioning the company and brand as quality leaders. Therefore, the quality perception of a brand name is only partially controllable by marketers in the short run. Marketers can control present and future efforts to associate the brand name with quality, especially through advertising. Moreover, the poorer the brand's past reputation, the greater will be the need to invest in repositioning to improve its image.

Estee Lauder, the manufacturer of Future Perfect, has a strong name appeal and has fostered a reputation for quality. As the leader in the upscale cosmetic market, the Estee Lauder name can add credibility to a new brand. The company maintains consistent marketing strategies for all its brands, to avoid diluting that image. The Ultima II brand name, one of the lesser renowned in the cosmetics industry, adds little prestige to a new brand. In the early 1980s, however, the company was the third leading brand in department store cosmetics. One manager who was interviewed suggested that a steady stream of product introductions, reformulations, relaunches, and dropped brands, was responsible for poisoning the company's image. Another manager maintained that Ultima II invested neither the time nor the financial resources to retain or strengthen its brand name appeal. Indeed, the Ultima II name was not even used for either the advertising or packaging of Megadose. To the degree that consumers did associate Megadose with Ultima II, there may have been some negative carryover. Although, that element does not appear to be the major cause of the disparate performance between the two brands in this case. The name "Megadose" itself is new to consumers and therefore certainly could not have had as powerful an influence as the Estee Lauder name.

STORE DISPLAY AS A QUALITY CUE

Location of the brand within the department store, as well as the appeal of the in-store display, can provide yet another indication of quality. The researchers visited several department stores throughout a large midwest city in order to inspect the store display characteristics of these competing brands. Estee Lauder uses its marketing muscle as the number one cosmetics supplier to get the prime traffic locations. Ultima II, however, either does not have the clout or has not invested sufficiently in trade promotion to obtain prime space. Since department stores allot the non-paid space on the basis of sales, Ultima II brands are frequently relegated to less desirable locations. The smaller space and rear location of Ultima II could be sending a signal contradictory to Megadose's higher prices.

The in-store display characteristics of a cosmetics brand can also be a quality cue. Estee Lauder displays its products in a glass case in the counter case (like a piece of fine jewelry), setting its brands apart and suggesting quality, distinctiveness, and expense. Ultima II has no special display technique; it simply places the brands in the case. Estee Lauder thus has taken advantage of another quality signaling opportunity.

SUMMARY OF CASE STUDY

Since the target market, distribution channels, relative quality levels, and prices of these two brands are remarkably similar, the only discernible difference lies in consumer perceptions of other marketing stimuli (advertising, packaging, brand name, and in-store displays). Thus support is given to the hypothesis that price signaling needs a complete, consistent set of quality cues to succeed.

However, this evidence does not necessarily imply a causal relationship. With case research, making reliable causal conclusions requires great care. One way to address this concern is to consider alternative explanations for the phenomenon (Alpert, 1989). Rejection of alternative explanations will increase support for the hypothesis.

One alternative explanation for Megadose's troubles is that it entered the skin moisturizer market about one year later than Future Perfect (see Table I). While there are strategic advantages in "being the pioneer", we do not believe that this was a predominant factor in explaining the differences in sales performance. In fact, neither

brand was an early entrant in the skin moisturizer segment. Time of entry should have had little, if any, effect in this study on the subject's reactions to quality perceptions of the advertisements and package designs.

Second, the survey results may have been affected by line image carryover. Respondents were exposed to the Estee Lauder name on the Future Perfect packaging and advertising. The Revlon and Ultima names were not on the advertisement or packaging for Megadose. However, respondents were carefully instructed to evaluate the quality of advertisements and packaging, not the overall brand. Furthermore, the advertisements and packaging ratings for Megadose were much weaker than those for Future Perfect, as Tables III and IV show. Only if the advertisements and packaging of both were closer in quality perceptions might a positive Lauder image carryover be the reason for the higher rating of Future Perfect's advertisements and packaging.

Third, while brand entry order, line image, managerial commitment, and other variables can play a role in determining success, it is important to note that in case research, researchers seek to "control" such extraneous factors by choosing a case where the focal effects are so clear and strong that they dominate all other factors. There can never be a case where every possible factor is exactly the same between two brands, but the strengths (tighter control) and weaknesses (artificiality) of our survey-based experimental design balances the strengths (realism) and weaknesses (lack of control) of our broader case research method.

MANAGERIAL IMPLICATIONS AND RECOMMENDATIONS

This case study of the cosmetic industry provides support to the proposition that the consistent and effective application of quality cues such as packaging, advertising, in-store support, and brand name appeal are necessary for the successful implementation of a signaling strategy. Furthermore, this pricing approach appears to be most effective when:

(1) consumers are able to get information about price more easily than information about quality;

(2) buyers want the high quality enough to risk buying the high-priced product even without a certainty of high quality; and

(3) there are a large number of uniformed consumers who do not understand quality and will pay the high price to reduce purchase risk.

Price signaling where high price is the sole quality signal is a tactic with limited potential. An integrated promotion and distribution program is necessary to support it. The concept of "quality signaling" should be substituted for "price signaling" in marketing analysis and planning, because the former recognizes the interdependency of marketing mix variables. Consider that in our study Megadose struggled with price signaling; Future Perfect triumphed with quality signaling. Marketers should be more aware of the distinction between price signaling (a price focus), quality signaling (a price, promotion, and place focus), and a premium product strategy (a complete product, price, promotion and place approach).

We now have an explanation for the weak correlation noted between price and objective quality: quality-signaling brands (such as Future Perfect) can thrive, and even price-signaling brands (such as Megadose) can survive. Indeed, the success of quality signaling can be seen as a demonstration of the power of effective promotion.

The consequences of effective quality signaling affect several constituents in the marketing environment: consumers, competitors, and society as a whole. A series of managerial suggestions follow:

* CERTAIN CONSUMER GROUPS ARE ESPECIALLY SUSCEPTIBLE TO PRICE SIGNALING TACTICS. Signaling is probably most effective with new or inexperienced consumers who do not know the relative quality of competing brands but find quality important. The purchase of a high-priced wine by the casual buyer is a good example.

The question arises, "How can these consumers educate themselves?" In the case of lower-priced, frequently purchased, non-durable goods, one approach would be to try several brands with a wide range of price points to evaluate the quality variation. For higher-priced, infrequently purchased, durable goods, first-time buyers should consult experienced users or read product reviews to reduce the purchase risk.

* COMPETITORS MUST DEVELOP ALTERNATIVE STRATEGIES TO COMBAT THE EFFECTS OF SUCCESSFUL PRICE AND QUALITY SIGNALING. There are three general tactics that can be applied to this dilemma. First, firms can replicate the quality signals used by the higher-price brands, thereby inducing trial purchasing. Second, competing brands, that are a better product or a better value need to educate consumers about their real advantages. The use of comparative advertising may be a powerful tool. Competitors would need to find a way to attack directly unwarranted quality images made by price-and quality-signaling brands. In a similar vein, competitors could use more informative rather than image-oriented advertisements to reduce the high search costs associated with most products. Also, free samples or coupons could be targeted to users of the competing price-and quality-signaling brands so consumers could become more knowledgeable and not need to use price as an indicator of quality. Third, some competitors could simply divert their marketing efforts to more price-sensitive segments of the market, and ride the current wave toward value pricing.

* THE LEGAL AND ETHICAL RAMIFICATIONS OF PRICE AND QUALITY SIGNALING NEED TO BE ADDRESSED. Currently there are virtually no legal constraints on the practice of price signaling. Price-or quality-signaling advertisements or packaging need not violate consumer protection laws. In actuality, consumers who use price to infer quality may not necessarily be worse off. To the extent that some buyers dislike searching for additional product information, one might suggest that firms following a signaling strategy actually provide some utility to these consumers. We tend to assume that, while brands using a signaling strategy do not have clearly superior products, at least they are rarely inferior products. If this is so, then we can infer that the benefit to consumers of buying higher-priced brands is that they avoid inferior products while saving on time costs of product information search and "thinking costs" (as the "cognitive misers" paradigm might say).

As long as consumers perceive that they are getting a satisfactory quality product and are happy with their purchase, then there may be no problem here serious enough to merit government intervention. Nevertheless, some may contend that there is an ethical issue for marketing managers using price-signaling tactics with the intent to deceive the consumer into paying a higher price than the product warrants. The historical solution has been, as long as there is no health or major financial risk, caveat emptor (let the buyer beware). To intervene with government regulation would make government the arbiter of product quality, a situation few desire. Consumers and competitors can cope with price and quality signaling, if they wish to.

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Exhibit 5
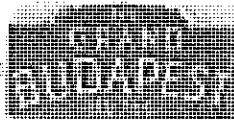
June 4, 2008

New Hints Seen That Red Wine May Slow Aging

By NICHOLAS WADE

Red wine may be much more potent than was thought in extending human lifespan, researchers say in a new report that is likely to give impetus to the rapidly growing search for longevity drugs.

The study is based on dosing mice with resveratrol, an ingredient of some red wines. Some scientists are already taking resveratrol in capsule form, but others believe it is far too early to take the drug, especially using wine as its source, until there is better data on its safety and effectiveness.

The report is part of a new wave of interest in drugs that may enhance longevity. On Monday, Sirtris, a startup founded in 2004 to develop drugs with the same effects as resveratrol, completed its sale to GlaxoSmithKline for $720 million.

Sirtris is seeking to develop drugs that activate protein agents known in people as sirtuins.

"The upside is so huge that if we are right, the company that dominates the sirtuin space could dominate the pharmaceutical industry and change medicine," Dr. David Sinclair of the Harvard Medical School, a co-founder of the company, said Tuesday.

Serious scientists have long derided the idea of life-extending elixirs, but the door has now been opened to drugs that exploit an ancient biological survival mechanism, that of switching the body's resources from fertility to tissue maintenance. The improved tissue maintenance seems to extend life by cutting down on the degenerative diseases of aging.

The reflex can be prompted by a faminelike diet, known as caloric restriction, which extends the life of laboratory rodents by up to 30 percent but is far too hard for most people to keep to and in any case has not been proven to work in humans.

Research started nearly 20 years ago by Dr. Leonard Guarente of the Massachusetts Institute of Technology showed recently that the famine-induced switch to tissue preservation might be triggered by activating the body's sirtuins. Dr. Sinclair, a former student of Dr. Guarente, then found in 2003 that sirtuins could be activated by some natural compounds, including resveratrol, previously known as just an ingredient of certain red wines.

Dr. Sinclair's finding led in several directions. He and others have tested resveratrol's effects in mice, mostly at doses far higher than the minuscule amounts in red wine. One of the more spectacular results was obtained last year by Dr. John Auwerx of the Institute of Genetics and Molecular and Cellular Biology in Illkirch, France. He showed that resveratrol could turn plain vanilla, couch-potato mice into champion athletes, making them run twice as far on a treadmill before collapsing.

The company Sirtris, meanwhile, has been testing resveratrol and other drugs that activate sirtuin. These drugs are small molecules, more stable than resveratrol, and can be given in smaller doses. In April, Sirtris

reported that its formulation of resveratrol, called SRT501, reduced glucose levels in diabetic patients.

The company plans to start clinical trials of its resveratrol mimic soon. Sirtris's value to GlaxoSmithKline is presumably that its sirtuin-activating drugs could be used to treat a spectrum of degenerative diseases, like cancer and Alzheimer's, if the underlying theory is correct.

Separately from Sirtris's investigations, a research team led by Tomas A. Prolla and Richard Weindruch, of the University of Wisconsin, reports in the journal PLoS One on Wednesday that resveratrol may be effective in mice and people in much lower doses than previously thought necessary. In earlier studies, like Dr. Auwerx's of mice on treadmills, the animals were fed such large amounts of resveratrol that to gain equivalent dosages people would have to drink more than 100 bottles of red wine a day.

The Wisconsin scientists used a dose on mice equivalent to just 35 bottles a day. But red wine contains many other resveratrol-like compounds that may also be beneficial. Taking these into account, as well as mice's higher metabolic rate, a mere four, five-ounce glasses of wine "starts getting close" to the amount of resveratrol they found effective, Dr. Weindruch said.

Resveratrol can also be obtained in the form of capsules marketed by several companies. Those made by one company, Longevinex, include extracts of red wine and of a Chinese plant called giant knotweed. The Wisconsin researchers conclude that resveratrol can mimic many of the effects of a caloric-restricted diet "at doses that can readily be achieved in humans."

The effectiveness of the low doses was not tested directly, however, but with a DNA chip that measures changes in the activity of genes. The Wisconsin team first defined the pattern of gene activity established in mice on caloric restriction, and then showed that very low doses of resveratrol produced just the same pattern.

Dr. Auwerx, who used doses almost 100 times greater in his treadmill experiments, expressed reservations about the new result. "I would be really cautious, as we never saw significant effects with such low amounts," he said Tuesday in an e-mail message.

Another researcher in the sirtuin field, Dr. Matthew Kaeberlein of the University of Washington in Seattle, said, "There's no way of knowing from this data, or from the prior work, if something similar would happen in humans at either low or high doses."

A critical link in establishing whether or not caloric restriction works the same wonders in people as it does in mice rests on the outcome of two monkey trials. Since rhesus monkeys live for up to 40 years, the trials have taken a long time to show results. Experts said that one of the two trials, being conducted by Dr. Weindruch, was at last showing clear evidence that calorically restricted monkeys were outliving the control animals.

But no such effect is apparent in the other trial, being conducted at the National Institutes of Health.

The Wisconsin report underlined another unresolved link in the theory, that of whether resveratrol actually works by activating sirtuins. The issue is clouded because resveratrol is a powerful drug that has many different effects in the cell. The Wisconsin researchers report that they saw no change in the mouse equivalent of sirtuin during caloric restriction, a finding that if true could undercut Sirtris's strategy of looking for drugs that activate sirtuin.

Dr. Guarente, a scientific adviser to Sirtris, said the Wisconsin team only measured the amount of sirtuin present in mouse tissues, and not the more important factor of whether it had been activated.

Dr. Sinclair said the definitive answer would emerge from experiments, now under way, with mice whose sirtuin genes had been knocked out. "The question of how resveratrol is working is an ongoing debate and it will take more studies to get the answer," he said.

Dr. Robert E. Hughes of the Buck Institute for Age Research said there could be no guarantee of success given that most new drug projects fail. But, he said, testing the therapeutic uses of drugs that mimic caloric restriction is a good idea, based on substantial evidence.

Exhibit 6

LETTERS

In response to Dr Browning, I did not lay the problems of general surgery "at the feet of primary care." Having been involved in an effort to undo the flawed sustainable growth rate system for the past decade, I know that the system is broken. In a rational world, specialties would unite to correct this flawed system, which seems cynically designed to pit specialties against each other.

The calculations for physician compensation used in the cited study of internal medicine reimbursement[3] cut off in 2004 while the increases in evaluation and management codes took place in 2004 through 2007. For example, evaluation and management codes increased in work relative value units from 2006 to 2007 (code 99213: increase from 0.67 to 0.92 [37%]; code 99214: 1.10 to 1.42 [29%]; and code 99215: 1.77 to 2.00 [12.9%]). Furthermore, this article has been rebutted.[4] The primary care–specialty income gap has largely been corrected, at an estimated cost of $4 billion.[5]

I appreciate the enthusiasm of Dr Maa and colleagues for the surgical hospitalist, particularly in emergency and trauma care. However, I do not believe this is the answer to the shortage of general surgeons, who not only do emergency and trauma care but often perform endoscopy and other general surgical operations in critical access hospitals.

Philosophically, I have difficulty with medical or surgical hospitalists. My objection to the medical hospitalist system is that patients may perceive that they are being abandoned by their primary care physician at a time of their most dire need—when they are sufficiently ill to require hospitalization. I would hope that this sense of abandonment is not present in a surgical hospitalist system. When we train "physicians who operate," we try to instill judgment about the need for surgery. But if operation is required, the operator must be thoroughly competent. I believe that such decisions are more informed when the physician/surgeon is familiar with the patient. The surgical hospitalist system may aid trauma and emergency care in urban centers but will not solve the access problem in small rural hospitals.

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RESEARCH LETTER

Commercial Features of Placebo and Therapeutic Efficacy

To the Editor: It is possible that the therapeutic efficacy of medications is affected by commercial features such as lower prices. Because such features influence patients' expectations,[1] they may play an unrecognized therapeutic role by influencing the efficacy of medical therapies, especially in conditions associated with strong placebo responses.[2,3] To investigate this possibility, we studied the effect of price on analgesic response to placebo pills.

Methods. In 2006 we recruited 82 healthy paid volunteers in Boston, Massachusetts, using an online advertisement. Each participant was informed by brochure about a (purported) new opioid analgesic approved by the Food and Drug Administration; it was described as similar to codeine with faster onset time, but it was actually a placebo pill. After randomization, half of the participants were informed that the drug had a regular price of $2.50 per pill and half that the price had been discounted to $0.10 per pill (no reason for the discount was mentioned). All participants received identical placebo pills and were paid $30. Participants were blinded to the study purpose, and researchers were blinded to group assignment. The study was approved by the Massachusetts Institute of Technology institutional review board, and all participants provided written informed consent and were debriefed after the study.

The protocol followed an established approach for studying pain.[4] Electrical shocks to the wrist were calibrated to each participant's pain tolerance. After calibration, participants received the test shocks, rating the pain on a computerized visual analog scale anchored by the labels "no pain at all" and "the worst pain imaginable." Participants received all possible shocks in 2.5-V increments between 0 V and their calibrated tolerance. Stimulation at each intensity level was carried out twice for each participant (before and after taking the pill), and the change in reaction to the stimulation was assessed. Visual analog scale ratings were converted to a 100-point scale, the postpill score for each voltage was subtracted from the prepill score, and the mean of these differences was calculated for each participant.

The percentage of participants experiencing a mean score reduction vs increase was compared between the 2 groups using a 2-tailed χ^2 test. Because stronger pain may be associated with stronger placebo responses,[5] we also compared results for the 50% most painful shocks for each participant. In addition, mean differences at each voltage between the 2 groups were compared overall with a sign test and individually with F tests. A P value of .05 was considered statistically significant. Analyses were performed using SPSS version 15 (SPSS Inc, Chicago, Illinois).

Results. Patient characteristics are shown in the TABLE. In the regular-price group, 85.4% (95% confidence interval [CI], 74.6%-96.2%) of the participants experienced a mean pain reduction after taking the pill, vs 61.0% (95% CI, 46.1%-75.9%) in the low-price (discounted) group ($P=.02$). Similar results

occurred when analyzing only the 50% most painful shocks for each participant (80.5% [95% CI, 68.3%-92.6%] vs 56.1% [95% CI, 40.9%-71.3%], respectively; $P = .03$).

Considering all voltages tested, pain reduction was greater for the regular-price pill $(P < .001)$. In addition, for 26 of 29 intensities (from 10 to 80 V), mean pain reduction was greater for the regular-price pill (FIGURE).

Table. Comparison of Participants Assigned to Regular-Price Placebo vs Low-Price (Discounted) Placebo

	Regular Price (n = 41)	Low Price (n = 41)	P Value
Women, No. (%)	27 (65.9)	24 (58.5)	.50
Age, mean (SD), y	30.9 (12.4)	30.0 (11.4)	.74
Calibrated maximum tolerance, mean (SD), V	51.8 (18.7)	54.9 (23.3)	.50
Shocks received, No. (SD)	18.2 (7.2)	18.6 (9.1)	.80
Change in pain scores[a] All shocks, No. (%) [95% CI]			
Pain reduction	35 (85.4) [74.6-96.2]	25 (61.0) [46.1-75.9]	.02[b]
Pain increase	6 (14.6) [3.8-25.5]	16 (39.0) [24.1-54.0]	
Highest-intensity shocks only, No. (%) [95% CI][c]			
Pain reduction	33 (80.5) [68.3-92.6]	23 (56.1) [40.9-71.3]	.03[b]
Pain increase	8 (19.5) [7.4-31.6]	18 (43.9) [28.7-59.1]	

Abbreviation: CI, confidence interval.
[a] Comparison of participants experiencing a mean reduction in pain after vs before the placebo pill was administered (visual analog scale point reduction between 0.01 and 48.4) and those experiencing a mean increase in pain (visual analog scale point increase between 0 and 29.2).
[b] Two-tailed χ^2 test.
[c] Highest 50% of shocks by intensity.

Figure. Pain Ratings by Voltage Intensity

No.															
Regular price	41	41	41	40	37	31	27	23	21	20	18	14	12	9	8
Low price	41	41	41	40	38	31	29	27	24	19	17	11	7	6	4
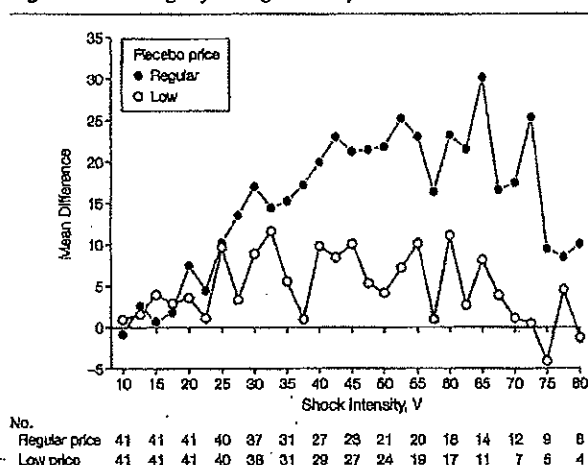
Mean difference in pain ratings, after vs before placebo, by voltage intensity. Higher value indicates greater pain reduction. The table depicts the intensity of the shocks and the number of observations in the regular-price and low-price conditions. P value is less than .05 for the shock intensities 27.5 V through 30.0 V, 35.0 V through 75.0 V, and 80.0 V.

Comment. These results are consistent with described phenomena of commercial variables affecting quality expectations[1] and expectations influencing therapeutic efficacy.[4] Placebo responses to commercial features have many potential clinical implications. For example, they may help explain the popularity of high-cost medical therapies (eg, cyclooxygenase 2 inhibitors) over inexpensive, widely available alternatives (eg, over-the-counter nonsteroidal anti-inflammatory drugs) and why patients switching from branded medications may report that their generic equivalents are less effective. Studies of real-world effectiveness may be more generalizable if they reflect how medications are sold in addition to how they are formulated. Furthermore, clinicians may be able to harness quality cues in beneficial ways,[6] for example, by de-emphasizing potentially deleterious commercial factors (eg, low-priced, generic).

These findings need to be replicated in broader populations and clinical settings to better understand how communicating quality cues with patient populations can maximize treatment benefits and patient satisfaction.

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Exhibit 7

BABA SHIV, ZIV CARMON, and DAN ARIELY*

The authors demonstrate that marketing actions, such as pricing, can alter the actual efficacy of products to which they are applied. These placebo effects stem from activation of expectancies about the efficacy of the product, a process that appears not to be conscious. In three experiments, the authors show that consumers who pay a discounted price for a product (e.g., an energy drink thought to increase mental acuity) may derive less actual benefit from consuming this product (e.g., they are able to solve fewer puzzles) than consumers who purchase and consume the exact same product but pay its regular price. The studies consistently support the role of expectancies in mediating this placebo effect. The authors conclude with a discussion of theoretical, managerial, and public policy implications of the findings.

Placebo Effects of Marketing Actions: Consumers May Get What They Pay For

Pro tali numismate tales merces. [One gets what one pays for.]
—Gabriel Biel (*Dictionary of Clichés*, Rogers 1985)

Consumers' beliefs and expectations, shaped by experiences in their daily lives, often influence their judgments of products and services. For example, consumers often believe and, therefore, judge lower-priced items to be of lower quality (see, e.g., Gerstner 1985; Huber and McCann 1982; Rao and Monroe 1989). Consumers' beliefs and expectations can also affect their subjective experiences. For example, a drink may taste better if it has a favorite brand's label than if it is unlabeled (Allison and Uhl 1964; McClure et al. 2004). Similarly, meat that is labeled 75% fat free tastes better than the same meat that is labeled as containing 25% fat (Levin and Gaeth 1988). The question that we address in this research is whether beliefs and expectations that marketing actions evoke can affect more than judgments and subjective consumption experiences. Specif-

ically, can they also influence the actual efficacy of the marketed product? For example, can consuming an energy drink that is purchased at a discount lead not only to judgments of lower quality or to a less favorable consumption experience but also to diminished performance in, for example, a cardiovascular workout or a puzzle-solving task?

We began to explore these questions in a preliminary study in which 38 members of a fitness center who exercised regularly (at least three times a week) consumed Twinlab Ultra Fuel before and during a workout session. Before consuming the energy drink, participants were shown the list of its ingredients and were told that the drink was from the most recently manufactured batch. One group of participants was told that we purchased the drink at the regular price of $2.89; another group was told that the regular price of the drink was $2.89 but that we had purchased it at a discounted price of $.89 because we bought it in bulk as an institutional purchase. After exercising, participants rated the intensity of their workout on a scale that ranged from -3 ("not at all intense") to $+3$ ("very intense") and how fatigued they felt on a scale that ranged from 1 ("not at all") to 7 ("very"). The results show that participants in the reduced-price condition rated their workout intensity as lower ($M = -.4$) than did those in the regular-price condition ($M = .6$; $F(1, 36) = 7.5$, $p < .01$), and participants in the reduced-price condition indicated that they were more fatigued ($M = 4.5$) than did those in the regular-price condition ($M = 3.7$; $F(1, 36) = 3.5$, $p < .10$). Finally, when asked during debriefing if the price of the drink affected the workout, not a single participant answered affirmatively.

The findings of our preliminary study share a kinship with the well-known placebo phenomenon in the medical

domain (see Stewart-Williams and Podd 2004). Specifically, patients' beliefs and expectations about the treatment they are receiving (e.g., an antidepression medication) can yield real changes to their health, even if the treatment is actually inert and has no inherent power to produce health effects (e.g., an inert sugar pill that looks like the anti-depression medication). A large body of research has examined effects of aspects that are inherent to a placebo, such as beliefs about the efficacy of a drug for which the placebo is a substitute (e.g., Kirsch 1999) or about the form in which the placebo is received (e.g., Kaptchuk et al. 2000). The results of our preliminary study suggest that features that are not inherent to a product, such as its price, can also trigger a placebo effect.

The preliminary study addresses the questions we raised in the first paragraph, and its results suggest that price discounts can lead to a behavioral effect—we refer to this as a placebo effect of marketing action in this research—and that this effect may occur beyond awareness. However, several criticisms can be leveled against this study. First, our dependent measure in this study is our participants' perceptions of their behavior (e.g., perceived workout intensity) rather than the behavior itself. Second, our study does not include a no-treatment control group. Therefore, we cannot distinguish between a desirable placebo effect (i.e., the regular-price fitness drink boosted the efficacy of the drink) and an undesirable placebo effect (i.e., the sale price detracted from the efficacy of the energy drink).[1] Third, participants did not actually pay for the drink but were merely informed of the prices. Finally, and most important, this study gives no indication of what underlies the effect. We address all these criticisms in our subsequent studies and also explore whether the effect is nonconscious, as the preliminary study suggests.

In the next section, we draw on research on the placebo effect and on the price–quality association to predict how beliefs and expectations that arise from marketing actions, such as price promotions, may produce effects on behavior. Following this, we present three experiments that document undesirable placebo effects that result from price discounts. In the third experiment, we also document a desirable

[1]Although some researchers (e.g., Hahn 1997) distinguish between placebo and nocebo effects, we use the term placebo for both, in line with the common view that the desirability of the effect should not influence its labeling (Stewart-Williams and Podd 2004).

placebo effect that is ignited by advertising claims. In all three experiments, we find support for the role of expectancies as underlying this effect, and we rule out alternative accounts.

THEORETICAL BACKGROUND

Voluminous research on placebo effects has shown that successfully conveying the false belief that patients received a particular treatment can bestow some of the benefits of the genuine treatment (for a review, see Stewart-Williams and Podd 2004). Credible placebos can help relieve and sometimes even cure physical and mental illness, such as pain (e.g., Montgomery and Kirsch 1996), cardiovascular disease (e.g., Bienenfeld, Frishman, and Glasser 1996), and depression (Kirsch and Sapirstein 1999). Placebo effects have also been detected with functional magnetic resonance imaging (fMRI; Wager et al. 2004).

Two notions are believed to account for placebo effects: expectancy theory and classical conditioning. According to expectancy theory, placebo effects arise because beliefs about a substance/procedure serving as a placebo activate expectations that a particular effect will occur, which then affect the subsequent effectiveness of the substance/procedure. The classical conditioning view considers consuming substances with known therapeutic effects to be conditioning trials. The active substances giving rise to these effects serve as unconditioned stimuli, and the vehicles by which they are delivered (e.g., pills, capsules, drinks) serve as the conditioned stimuli. Pairing the unconditioned stimuli and the conditioned stimuli over time endows the vehicles with a capacity to evoke therapeutic effects in the form of conditioned responses. These two views have been contrasted and debated, but an emerging view is that expectancies mediate all placebo effects, and conditioning is one means by which people initially form and then activate expectancies (Kirsch 2004; Rescorla 1988). The growing acceptance of expectations as the basic mechanism for placebo effects has led to an increased interest in how beliefs lead to placebo effects and the role of expectancies in mediating this effect.

The Mediating Role of Expectancies

Figure 1 highlights the process associated with placebo effects, a framework that we derive from work in the medical domain (Kirsch 1999; Kirsch and Lynn 1999; Kirsch

Figure 1
FRAMEWORK FOR PLACEBO EFFECTS
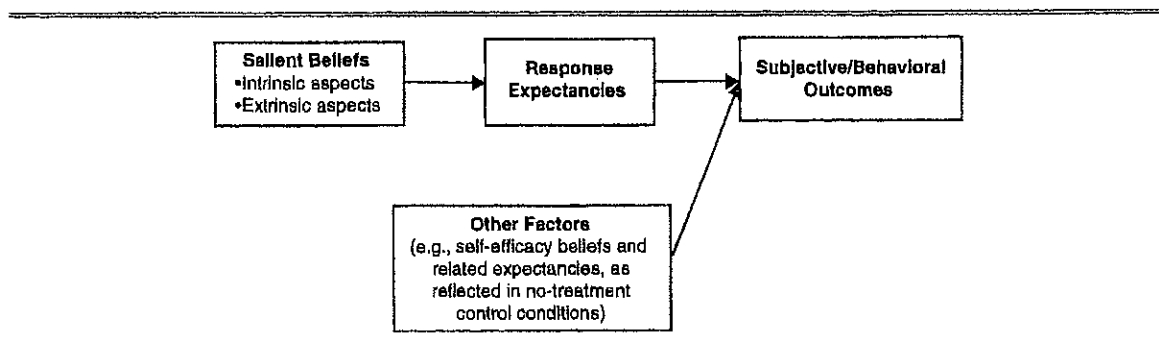
and Sapirstein 1999; Stewart-Williams and Podd 2004). The figure presents factors that are expected to influence placebo effects of marketing actions. Briefly, when a person receives what is purportedly an active substance or treatment, his or her salient beliefs about the substance or treatment activate response expectancies, or anticipations of subjective and/or behavioral consequences of using the substance or being treated. These response expectancies along with contextual factors that are unrelated to the substance or treatment then lead to the subjective and behavioral outcomes, or placebo effects.

Several aspects of this process warrant elucidation. First, critical to the placebo effect are specific beliefs that are salient when a person receives the purportedly active substance or treatment. These beliefs, for example, could be related to intrinsic aspects of the active substance or treatment, such as its potential therapeutic effects or its deleterious side effects, yielding a desirable placebo effect in the former case and an undesirable placebo effect in the latter case (see Hahn 1997). Similarly, extrinsic aspects can shape salient beliefs about the substance or treatment and lead to stronger (weaker) placebo effects. An example of this is whether a person receives a medication through injections or capsules (Kaptchuk et al. 2000).

Second, the magnitude of the subjective and/or behavioral consequences depends on the strength of the activated response expectancies, which in turn can be influenced by a variety of factors. For example, encouraging people to elaborate on their expectations may enhance the magnitude of the placebo effect (Fillmore and Vogel-Sprott 1992). Similarly, the magnitude of the placebo effect may be influenced by the strength of a person's salient beliefs about the active substance or treatment. In turn, for example, this can be enhanced by greater familiarity through prior usage (Kirsch 1985). The strength of these beliefs and, therefore, the magnitude of the placebo effect may also be diminished by instructions that cast doubts about these beliefs. For example, alerting people that they are participating in a double-blind study and that the substance they are receiving may be inert gives rise to diminished placebo effects (Kirsch and Weixel 1988).

Third, the subjective and behavioral outcomes can be shaped by self-efficacy beliefs (Kirsch 1985), which, together with other extraneous factors, are reflected in outcomes of no-treatment control conditions that are sometimes included in placebo studies. Finally, the process by which expectancies are elicited to lead to the placebo effect can be either conscious or nonconscious. Consistent with one aim of our research, Stewart-Williams and Podd (2004) call for research on placebo effects that will identify situations in which the mediating role of expectancies occurs nonconsciously. Next, we examine implications of the framework for placebo effects that may arise from marketing actions, such as price discounts.

Marketing Actions and the Placebo Effect

If marketing actions, such as price discounts, lead to a placebo effect, as our preliminary study suggests, what might be the nature of beliefs that trigger response expectancies that, in turn, lead to the placebo effect? Furthermore, how will contextual factors influence the strength of the expectancies and, thus, the magnitude of the effect? To answer these questions, consider the context of the pre-

liminary study. Recall that participants received an energy drink (Twinlab Ultra Fuel), were shown a list of its ingredients, and were informed that we purchased the drink at either its regular price or a discounted price. The stimulus materials could have made several beliefs salient. For example, intrinsic aspects related to the ingredients could have activated beliefs about their effects. In addition, the brand name (an extrinsic cue) could have activated beliefs about the product's superior quality (Rao and Monroe 1989). Furthermore, given that consumers often believe that price levels tend to reflect quality (e.g., Huber and McCann 1982; Rao and Monroe 1988, 1989), the price discount (another extrinsic cue) may have triggered beliefs that the product's quality was inferior. According to the framework we presented previously, all these beliefs could have been salient, triggering various types of response expectancies. These response expectancies along with other factors, such as non-product-related beliefs (e.g., self-efficacy beliefs, such as how good a person is at fitness workouts) and participants' abilities, could have affected respondents' performance in their fitness workout. However, because price was the only manipulated factor in the preliminary experiment and because participants were randomly assigned to the two levels of this factor (thereby controlling for other factors, such as beliefs about the ingredients, the brand name, or self-efficacy), the difference we observed in participants' performance is likely to have been due to the salient beliefs about price, that is, a placebo effect of price discounts. Conversely, participants' performance in a no-treatment control condition would have reflected effects of the other factors, such as non-product-related beliefs, participants' abilities, and so forth.

Next, we consider the implications of other aspects of the framework in relation to our preliminary study, and we draw predictions for similar studies we present subsequently. The magnitude of the placebo effect could be affected by a host of factors. First, encouraging participants to elaborate on their expectations could increase the strength of those expectations and, thus, the magnitude of the observed placebo effect. We test this prediction in our first study. Second, beliefs about the brand name and/or the ingredients should be stronger with greater (rather than lower) frequency of prior usage. Thus, in addition to the observed price effect, we expect that frequency of prior usage influences the behavioral outcome. We provide evidence relating to prior usage in our first two studies. Third, if we draw participants' attention to their price–quality beliefs, many may realize that the price–quality relationship is not applicable, which should weaken the impact of such beliefs and, thus, the magnitude of the placebo effect. We test this prediction in our second study. Finally, consider what might happen if we presented advertising claims that either strengthened or weakened participants' beliefs in the efficacy of the ingredients (an intrinsic cue). This manipulation should have independent effects on participants' performance, in addition to the observed placebo effect of price discounts. We examine this in the third study.

The discussion in the previous section also suggests that the process by which expectancies are elicited to lead to the placebo effect can be either conscious or nonconscious (see Kirsch 2004; Stewart-Williams and Podd 2004). Thus, the question is whether the placebo effects of price discounts are conscious. Rao and Monroe (1988) argue that the rela-

tionship between price and perceived quality is a belief that is activated and used when people make rapid judgments about a product's quality. Adaval and Monroe (2002) suggest that price–quality beliefs are activated and affect judgments at a nonconscious level.

Building on these ideas, we conducted three experiments. In these experiments, we investigated whether price discounts lead to placebo effects by activating response expectations and whether the process by which these activated expectations lead to the placebo effect is in line with our previous predictions.

EXPERIMENT 1

The purpose of Experiment 1 was to (1) document evidence of a placebo effect caused by price discounts; (2) explore what underlies the placebo effect by examining whether the observed effects are mediated by expectancies, in line with findings in the medical domain; and (3) determine whether the impact of expectancies on the observed placebo effect occurs nonconsciously.

In this experiment, participants first consumed SoBe Adrenaline Rush (a drink that claims to help increase mental acuity on its package) and then solved a series of puzzles. Note that such drinks are familiar to the student population from which we derived our sample. Indeed, in response to measures we collected at the end of this experiment, 92% of the participants stated that they had heard of SoBe before, and 48% stated that they had consumed this drink before. To accomplish the first goal of this experiment, we collected a measure of performance, namely, the number of puzzles solved correctly. To accomplish the second goal, we adapted a procedure that Fillmore and Vogel-Sprott (1992) used to vary the strength of activated response expectancies. Specifically, one group of participants elaborated on their expectancies by rating the expected efficacy of the drink before solving the puzzles, and a second group did not perform this rating task. If expectancies indeed mediate an observed placebo effect, strengthening response expectancies should amplify the basic effects. To accomplish the third objective, we used a straightforward dependent variable approach that we adapted from previous work on nonconscious processes (see, e.g., Fitzsimons, Chartrand, and Fitzsimons 2004). After participants completed the puzzle task, we asked them to rate how effective SoBe was at improving their puzzle-solving performance on a scale that ranged from 1 ("not at all effective") to 7 ("very effective"). If participants were (non)conscious of the impact of expectancies related to the efficacy of SoBe on their subsequent performance, this measure should (not) mediate the effects of the independent variables on the number of puzzles solved. Note that the underlying process has two components: (1) activation of expectancies and (2) subsequent impact of those expectancies on participants' performance in the puzzle task. Even if the first component occurs at a nonconscious level, the procedure we used to strengthen expectancies would make expectancies conscious (in conditions in which participants were asked to rate the efficacy of the drink). Thus, lack of mediation would suggest only that the second component occurs nonconsciously. We explore the nature of the first component in Experiment 2 because our approach in Experiment 1 does not enable us to learn about it.

Design and Procedure

We used a 2 (price: regular versus discounted) × 2 (expectancy strength: high versus low) between-subjects design. We randomly assigned 125 participants to the four conditions. At the beginning of the session, participants were told that as part of the study, they would consume SoBe. As in the preliminary study, they were shown the packaging and the ingredients it contained and were told that the drink was from the most recently manufactured batch. To reinforce the sense that the energy drink would influence their performance, participants were then told that they would watch a video for about ten minutes, purportedly to allow the ingredients to have their effects. They were also told that after watching the video, they would solve a series of word-jumble puzzles (e.g., TUPPIL, the solution for which is PULPIT); their goal was to solve as many puzzles as possible in the allotted 30 minutes. Before the drink was distributed, participants were given a form that authorized us to charge their university billing account for the drink that they would consume. For some participants (regular-price conditions), the form stated that they would be charged $1.89 and that this was the regular price of the drink in retail outlets. For other participants (reduced-price conditions), the form stated that the regular price of the drink at retail outlets was $1.89 but that they would be charged $.89 because we purchased the drink at a discount as part of an institutional purchase.

Participants consumed the drink and then watched a video for about ten minutes. They then received a booklet that contained instructions on the cover page, followed by the puzzles. The instructions on the cover sheet stated that participants would have 30 minutes to solve 15 puzzles. After the cover page, some respondents (high-expectancy-strength conditions) were shown a page with the following statements: "I feel that SoBe is 'very bad' (1)/'very good' (7) at improving concentration," and "I feel that SoBe is 'very bad' (1)/'very good' (7) at improving mental performance." Respondents in the low-expectancy-strength conditions were not shown these statements. Subsequently, participants engaged in the puzzle task and then responded to a series of measures; finally, they were debriefed.

Other Measures

After solving the puzzles, participants indicated their gender; whether they were familiar with SoBe; whether they had consumed this drink before; and, in general, how good and how experienced they were at solving puzzles such as word jumbles. These measures served as covariates in the various analyses. At the end of the instrument, we asked participants to recall the price they paid for the drink (in this and in our other experiments, all participants in the treatment conditions recalled the price they had paid within a range of +/–11% accuracy, and there were no differences in recall across the various treatment conditions). After the experiment, an independent coder determined the number of puzzles that each respondent solved correctly.

Results

Pilot study. We first conducted a pilot study to assess participants' performance in a no-treatment (control) condition. For the pilot study, we used 31 participants from the same population as that of the main experiment. The procedure

closely followed the one we used in the main experiment, except that the participants were not told about the SoBe drink and did not consume it; they merely solved the puzzles and responded to a relevant subset of the measures. The average number of puzzles solved by the participants of the pilot study was 9.1.

Main experiment. The average number of puzzles solved across the various conditions appears in Figure 2. An analysis of covariance (ANCOVA) on the number of puzzles solved revealed an interaction between price and expectancy strength ($F(1, 120) = 5.6, p < .05$) and a main effect of price ($F(1, 120) = 34.7, p < .0001$). The pattern of results in the low-expectancy-strength conditions was consistent with a placebo effect; the number of puzzles solved was lower in the reduced-price condition ($M = 7.7$) than in the regular-price condition ($M = 9.5$; $F(1, 120) = 5.9, p < .05$).

The results in the high-expectancy-strength conditions suggest that the observed placebo effect was indeed mediated by expectancies about the efficacy of the drink. As Figure 2 shows, when expectancy strength was high, the magnitude of the undesirable placebo effect in the low-expectancy-strength conditions increased. Specifically, when the price was discounted, the number of puzzles solved decreased further at higher ($M = 5.8$) rather than lower ($M = 7.7$) levels of expectancy strength ($F(1, 120) = 7.7, p < .01$).

A Sobel test (e.g., MacKinnon et al. 2002) within the high-expectancy-strength conditions further supports mediation by expectancies. Recall that we operationalized expectancy strength by asking respondents in the high-expectancy-strength conditions to rate how good SoBe was at improving concentration and mental performance before they solved the puzzles (we did not ask respondents in the low-expectancy-strength conditions this question). In line with our conceptualization, these ratings were higher in the regular-price condition ($M = 4.3$) than in the reduced-price condition ($M = 3.5$; $F(1, 64) = 11.1, p < .01$). The Sobel test revealed that these ratings also mediated the effects of the independent variable, price, on the number of puzzles

solved within the high-expectancy-strength conditions ($z = 3.0, p < .01$).

The only covariate that was relevant in the ANCOVA was prior consumption of SoBe, a variable that did not interact with any of the other independent factors. To explore the effects of prior usage further, we performed an analysis of variance with prior usage, a categorical variable, as a third independent factor. Again, the only effect we observed for prior usage was a main effect; on average, participants who had consumed SoBe before solved more puzzles ($M = 8.7$) than did those who had not ($M = 7.7$; $F(1, 117) = 4.2, p < .05$), as we predicted in our framework.

Was the underlying process conscious? To answer this question, we examined participants' responses to a measure that we collected after they solved the puzzles. Recall that after participants solved the puzzles, they were asked how effective they believed SoBe was at improving their puzzle-solving performance (1 = "not at all effective," 7 = "very effective"). Had participants been conscious that their performance was affected by consumption of the drink, this measure would have mediated the effects of the independent variables on the number of puzzles solved. A Sobel test did not support this possibility ($p = .64$), suggesting that expectancies were not conscious when participants solved the puzzles. However, note that this null result is difficult to interpret because it could have occurred for reasons other than the process being nonconscious. We test the potential nonconscious nature of the underlying process more explicitly in the next experiment.

Discussion

The results of Experiment 1 support our basic prediction that price discounts can lead to an undesirable placebo effect. Offering a price discount on a product that claims to be beneficial for mental acuity negatively affected performance on a subsequent task, namely, the number of puzzles solved correctly. The performance of participants who consumed the discounted drink was worse than that of participants who consumed the regular-priced drink and of those who were in the no-treatment pilot study (and did not consume the drink). This detrimental effect was accentuated when we reinforced expectations about the efficacy of the product. Furthermore, on average, participants who had consumed the energy drink before solved more puzzles than did those who had not. However, this variable did not interact with any of the other independent variables. Finally, the results suggest that the underlying process leading to our observed placebo effect occurred nonconsciously.

A noteworthy finding in Experiment 1 was that we observed only an undesirable placebo effect in the reduced-price conditions. The results in the regular-price conditions were no different than the results in the no-treatment control condition (which we administered as a pretest). In the next experiment, we examine whether the findings of Experiment 1 replicate and shed more light on the cause of the observed placebo effect.

EXPERIMENT 2

One goal of Experiment 2 was to examine why we did not observe a desirable placebo effect of the regular-priced drink in Experiment 1. A second goal was to rule out two alternative accounts: (1) that participants paying the regular

Figure 2
NUMBER OF PUZZLES SOLVED: EXPERIMENT 1
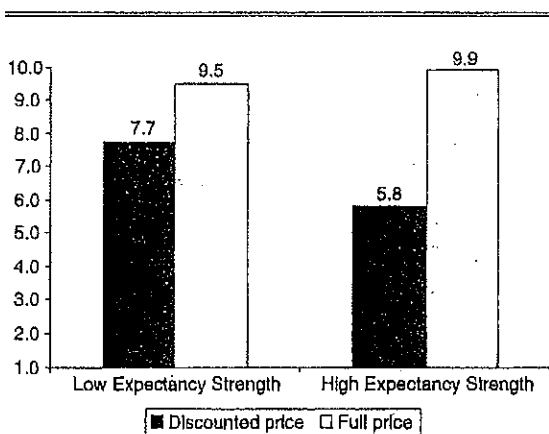
Notes: The number of puzzles solved in the control condition = 9.1.

price might have worked harder on the puzzle task to reduce the greater dissonance they might have experienced as a result of the regular price they paid and (2) that compared with participants in the regular-price condition, those in the reduced-price conditions concentrated less on the puzzle task as a result of entertaining distracting thoughts about getting the drink at a lower price. A third goal of Experiment 2 was to examine whether drawing attention to price–quality beliefs would affect the observed placebo effect. This enables us to test several predictions. First, drawing participants' attention to price–efficacy beliefs is likely to help some of them realize that these beliefs may not be applicable to all contexts. In turn, this should weaken their response expectations and, thus, the magnitude of the placebo effect (see Kirsch and Weixel 1988).[2] Second, the procedure enables us to shed more light on whether the underlying process is nonconscious. Research has consistently shown that if the activation of information in memory occurs nonconsciously, drawing attention to the priming source (in our case, the relationship between price and expected efficacy) reduces subsequent effects of this information (e.g., Strack et al. 1993). This attenuating effect is likely to occur when drawing attention to the priming source casts doubts on the relevance of the priming source. Conversely, if the activation of the information occurs consciously, drawing attention to the priming source enhances subsequent effects of the information. Third, if drawing participants' attention to the price–efficacy beliefs reduced the magnitude of the observed placebo effect, it would reduce the viability of the alternative cognitive dissonance account. According to the dissonance explanation, drawing attention to the price of the drink should increase dissonance in the regular-price condition, thus enhancing rather than attenuating the magnitude of the basic effect.

To accomplish the third goal of examining whether drawing attention to price–quality beliefs affects the placebo effect, we modified the procedure that we used in Experiment 1 to strengthen expectancies before the puzzle task. Recall that in Experiment 1, we manipulated the strength of expectancies by having one group of participants respond to the following statements before the puzzle task: "I feel that SoBe is 'very bad' (1)/'very good' (7) at improving concentration," and "I feel that SoBe is 'very bad' (1)/'very good' (7) at improving mental performance." In Experiment 2, one group of participants rated similar statements, except that their attention was also drawn to the price–efficacy link by the following words that we added to the beginning of the statements: "Given the price I was charged for SoBe,..."

To summarize, Experiment 2 used a 2 (price: regular versus discounted) × 2 (price–efficacy salience: low versus high) between-subjects design and a control condition.

Apart from modifying the task to incorporate the price–efficacy salience factor, adding measures to serve as covariates, and conducting Experiment 2 using computers, the procedure paralleled the one we used in Experiment 1 (our using a computerized rather than a paper-and-pencil task as in Experiment 1 may account for some differences in the performance levels across Experiments 1 and 2). A total of 193 undergraduate students participated in the study.

Results

The average number of puzzles solved across the various conditions appears in Figure 3. An ANCOVA on the number of puzzles solved revealed an interaction between price and price–efficacy salience (F(1, 189) = 5.1, p < .05) and a main effect of price (F(1, 189) = 3.1, p < .10). As in Experiment 1, prior consumption of SoBe was a relevant covariate that did not interact with any other factor, and on average, participants who had consumed SoBe before solved more puzzles than did those who had not (see Kirsch 1985).

The results in the low price–efficacy salience conditions paralleled those in the low-expectancy-strength conditions of Experiment 1. As in Experiment 1 and consistent with a placebo effect of price discounts, the number of puzzles solved was lower in the reduced-price condition (M = 6.8) than in the regular-price condition (M = 8.3; F(1, 189) = 7.8, p < .01) and the control condition (M = 8.0; F(1, 189) = 5.0, p < .05). In addition, the number of puzzles solved was not different between the regular-price and the control conditions (F < 1). As in Experiment 1, we obtained only an undesirable placebo effect of discounted prices and no desirable placebo effect of the regular-priced drink. We discuss this finding subsequently.

The results in the high price–efficacy salience conditions suggest that drawing attention to price–efficacy beliefs weakens these beliefs, thus eliminating the placebo effect (Ms = 8.2 and 8.0, respectively, in the reduced- and regular-price conditions). In addition, that drawing attention to the

Figure 3
NUMBER OF PUZZLES SOLVED: EXPERIMENT 2
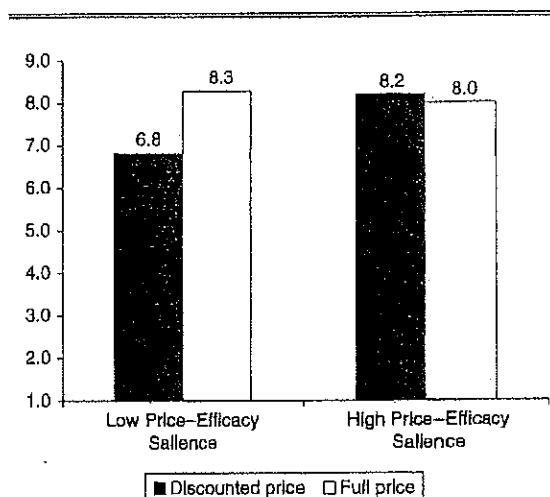
Notes: The number of puzzles solved in the control condition = 8.0.

price–efficacy link eliminated the placebo effect is consistent with the initial activation of expectancies being nonconscious (see Strack et al. 1993). In further reducing the viability of this alternative account, drawing attention to the price of the drink not only eliminated the basic effect but also resulted in means that were in the opposite direction of what the cognitive dissonance and the distraction explanations predict. Finally, note that both of these alternative accounts rely on participants paying for their drink in our experiments. However, although participants in the fitness study we presented in the introduction did not pay for the energy drink, we observed a placebo effect in that study.

We found further support for our conceptualization by examining the expectancy measures that we collected in the high price–efficacy salience conditions before the puzzle-solving task (to operationalize the price–efficacy salience factor). According to our conceptualization, drawing attention to the price–efficacy link should make the expectancies in the reduced-price condition parallel to those in the regular-price condition. Indeed, the expectancy ratings were not different across the two price levels (Ms = 4.3; F < 1).

Why did we not observe a desirable placebo effect? A question that arises from Experiments 1 and 2 is why there was no desirable placebo effect of the regular-priced drink and an undesirable placebo effect of the reduced-price drink. Part of the answer to this question comes from examining participants' expectancies before the puzzle-solving task in the no-treatment control condition. Note that unlike the treatment participants, the control participants were given neither SoBe nor the accompanying instructions that emphasized the price of the drink before they completed the puzzle-solving task. Thus, beliefs about the price of SoBe could not be activated in these participants. However, as we show in Figure 1, other beliefs (e.g., about participants' natural [unaided] ability in tasks such as solving word puzzles) may have been more salient to control participants. Among treatment participants, these self-efficacy beliefs may have been less salient as a result of the external cues that were presented (e.g., the drink's price having been presented more than once at the beginning of the experiment). In summary, a combination of two reasons may account for our results: (1) Price-related (self-efficacy) beliefs may have been the most salient to participants in the treatment (control) conditions as a result of the procedure we used, and therefore (2) the resulting expectancies related to self-efficacy beliefs in the control conditions may have been as high as those related to price in the regular-price conditions. To test these accounts, we first examined a measure related to self-efficacy beliefs that was collected at the end of the experiment; participants were asked to rate how good they were in general at solving word puzzles on a scale that ranged from 1 ("not at all good") to 7 ("very good"). As we expected, the mean rating on this measure was higher in the control condition (M = 3.9) than in the regular-price condition (M = 3.2; F(1, 189) = 4.5, p < .05) and the reduced-price condition (M = 3.3; F(1, 189) = 3.8, p < .05).

To explore this finding further, we conducted a separate study to assess expectancies before the puzzle-solving task (those expectancies were not administered in the control conditions of the main experiments). We had 61 participants from the same population as that in the main studies perform a task that was similar to those of Experiments 1 and 2. Participants were randomly assigned to one of three con-

ditions: two treatment conditions (regular price and reduced price) and one no-treatment control condition. After participants received the initial instructions and paid for their drinks (in the treatment conditions), they performed a filler task and then rated their expected concentration and mental performance during the subsequent puzzle-solving task on two scales that we adapted from those administered in the high-expectancy-strength conditions of Experiment 1. As we expected, the mean expectations were not different in the regular-price condition (M = 4.6) and control condition (M = 4.4; F < 1) but were lower in the reduced-price condition (M = 3.3) than in the control condition (F(1, 58) = 22.4, p < .0001). These findings suggest that a possible reason we did not observe a desirable placebo effect of the drink in the regular-price conditions of Experiments 1 and 2 was that the expectations before the puzzle-solving task were not different in these conditions from those in the no-treatment control conditions.

Discussion

The results of Experiment 2 provide further support for a placebo effect due to price discounts. We replicated the findings of Experiment 1 in the low price–efficacy salience conditions of Experiment 2; that is, the number of puzzles participants solved was lower when they purchased the product at a discounted price than when they purchased it at the regular price. Furthermore, as in Experiment 1, we observed an undesirable placebo effect in the reduced-price condition but not a desirable placebo effect in the regular-price condition, compared with the no-treatment control. Experiment 2 sheds additional light on the underlying process. Specifically, drawing attention to the price–efficacy beliefs before participants solved puzzles reduced the strength of response expectancies, eliminating the undesirable placebo effect we observed in the reduced-price condition. Furthermore, in line with prior work on nonconscious effects of biasing information, when participants' attention was drawn to the relationship between price and the product's efficacy, the placebo effect did not occur. This result supports the notion that the process leading to the placebo phenomenon we observed occurs nonconsciously. Finally, that the basic effect was attenuated rather than enhanced reduces the viability of an alternative account related to cognitive dissonance.

Experiment 2 also sheds light on a potential reason for our observing only an undesirable placebo effect in the first two experiments. First, self-efficacy ratings were higher in the control condition than in the treatment conditions. We discuss this finding further in the "General Discussion" section. Second, a separate study revealed that expectancies in the regular-price condition were not different from those in the no-treatment control, which can account for the finding that the number of puzzles solved was not different across these conditions.

EXPERIMENT 3

Experiment 3 had several goals. One goal was to obtain further support for the role of response expectancies in the placebo effect of price discounts that we observed. Enhancing the antecedent intrinsic beliefs about the active substance or treatment through advertising claims, for example, should strengthen expectancies and, therefore, the subse-

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quent placebo effect. Accordingly, we manipulated not only the price factor as in the previous two experiments but also another marketing variable related to intrinsic beliefs about the effectiveness of SoBe. We presented the following instructions on the cover page: "Drinks such as SoBe have been shown to improve mental functioning, resulting in improved performance on tasks such as solving puzzles. In fact, the Web site of SoBe includes references to over 50 scientific studies suggesting that consuming drinks like SoBe can significantly improve mental functioning (in the high-expectancy-strength conditions)/slightly improve mental functioning (in the low-expectancy-strength conditions)." We expected that adding this second factor related to expectancy strength would enable us to observe a desirable placebo effect (in the regular-price, high-expectancy-strength condition), which we had not observed in the previous two experiments.

A second goal of Experiment 3 was to examine the role of other mediators of the observed effects. Note that in Experiments 1 and 2, we found that response expectancies that were measured before the puzzle-solving task mediated the observed effects. However, we did not examine how respondents felt during the puzzle-solving task. Specifically, did respondents in the regular-price conditions feel more motivated and alert during the task than respondents in the reduced-price conditions? To accomplish the second goal, we administered measures after the puzzle-solving task. We asked participants to rate how alert and how motivated they felt during the puzzle-solving task using seven-point scale items, with the last item reverse scaled.

A third goal of Experiment 3 was to rule out an alternative account related to mood states. It is possible that participants in the reduced-price conditions of Experiments 1 and 2 were in a more positive mood state (because they had received the drink at a discount) than those in the regular-price conditions. Research on mood state effects suggests that positive mood states can impair cognitive capacity and evoke less careful and substantive process styles than less positive mood states (for a review, see Forgas 1995). This might account for why participants in the reduced-price conditions solved fewer puzzles. We tested the validity of this account by collecting measures of mood states (in line with the work of Watson, Clark, and Tellegen [1988]) before participants completed the puzzle-solving task.

To summarize, Experiment 3 used a 2 (price: regular versus discounted) × 2 (expectancy strength: low versus high) between-subjects design and a control condition. Apart from modifying the task to incorporate the expectancy-strength factor, including expectancy measures before the puzzle-solving task in all conditions (as in the high-expectancy-strength conditions of Experiment 1) and changing some of the puzzles for logistical reasons, the procedure paralleled those we used in Experiments 1 and 2. Our changes to some of the puzzles may account for some differences in the basic results across Experiments 1, 2, and 3. A total of 204 undergraduate students participated in the study.

Results

The average number of puzzles solved in the various conditions appears in Figure 4. An ANCOVA on the number of

Figure 4
NUMBER OF PUZZLES SOLVED: EXPERIMENT 3
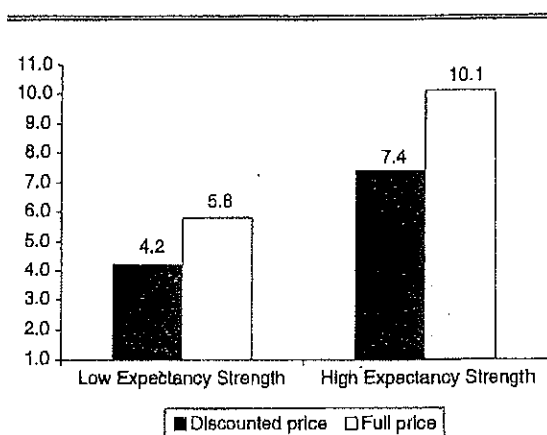
Notes: The number of puzzles solved in the control condition = 6.8. Before solving the puzzles, participants in all treatment conditions rated their drink-related expectancies as did those in the high-expectancy-strength conditions of Experiment 1.

puzzles solved revealed an interaction between price and price–efficacy salience ($F(1, 196) = 3.8$, $p < .05$) and main effects of price ($F(1, 196) = 54.6$, $p < .0001$) and expectancy strength ($F(1, 196) = 132.8$, $p < .0001$). Note that unlike Experiments 1 and 2, prior consumption of SoBe was not a relevant covariate, probably because virtually all participants indicated that they had consumed this drink before.

The results in the low-expectancy-strength conditions paralleled those in the corresponding conditions of Experiment 1 and the low price–efficacy salience conditions of Experiment 2. As in Experiments 1 and 2 and consistent with a placebo effect, the number of puzzles solved was lower in the reduced-price condition ($M = 4.2$) than in the regular-price condition ($M = 5.8$; $F(1, 196) = 15.1$, $p < .0001$) and the control condition ($M = 6.8$; $F(1, 196) = 33.1$, $p < .0001$). In addition, the number of puzzles solved in the regular price, low-expectancy-strength condition was lower ($M = 5.8$) than in the control condition ($M = 6.8$; $F(1, 196) = 3.6$, $p < .10$), indicating that presenting weak claims about the efficacy of SoBe resulted in an undesirable placebo effect even when the drink was sold at its regular price.

The results in the high-expectancy-strength conditions were also consistent with our conceptualization. Specifically, presenting strong claims about the efficacy of SoBe to strengthen response expectancies increased the number of puzzles solved in those conditions compared with the low-expectancy-strength conditions. The number of puzzles solved in the reduced-price condition was again lower ($M = 7.4$) than that in the regular-price condition ($M = 10.1$; $F(1, 196) = 42.8$, $p < .0001$), but the number was higher in the regular-price condition than in the control condition ($F(1, 196) = 73.1$, $p < .0001$), a desirable placebo effect that we had not observed in our previous experiments.

We found further support for our conceptualization by examining the expectancy measures that we collected across all conditions before the puzzle-solving task. In line with our conceptualization, when the expectancy strength was low, these ratings were lower in the reduced-price condition (M = 3.2) than in the regular-price condition (M = 3.6; F(1, 196) = 3.4, $p < .10$) and the control condition (M = 4.2; F(1, 196) = 15.1, $p < .0001$). When the expectancy strength was high, these ratings were again lower in the reduced-price condition (M = 4.7) than in the regular-price condition (M = 5.9; F(1, 196) = 25.4, $p < .0001$). Furthermore, a Sobel test revealed that these ratings mediated the effects of the independent variables on the number of puzzles solved (z = 2.3, $p < .05$).

Alertness and motivation during the task. Recall that after the puzzle-solving task, we asked participants how alert and motivated they felt during the task. Separate Sobel tests revealed that only the alertness measure mediated the effects of the independent variables on the number of puzzles solved (z = 2.0, $p < .05$; in addition, the pattern of results on this measure mirrored that of the number of puzzles solved). This finding is reasonable given that a major claim of this drink is that it boosts alertness. The other measure (which, incidentally, the drink does not claim to influence) was not relevant as a mediator ($p > .60$).

Did mood mediate the observed effects? An alternative account for our findings is that participants who bought the drink at a discount were in a more positive mood state than those who purchased it at the regular price. However, the mood explanation predicts only a main effect of price and not an interaction with a second factor, such as expectancy strength, that we find in all three experiments. To reduce the viability of the mood account further, we collected measures of mood states before the puzzle-solving task. Separate ANCOVAs with the positive and negative mood measures revealed no relevant effects.

Discussion

Experiment 3 documented not only an undesirable placebo effect as in our previous experiments but also a desirable placebo effect. Specifically, participants who purchased the drink at its regular price and were presented with strong advertising claims about the drink solved more puzzles than did participants in the control condition. Results of this experiment also suggest that participants felt more alert in the regular-price condition than in the reduced-price conditions and that this mediated the placebo effect, consistent with a claimed effect of the drink (i.e., helping people feel more alert). Finally, Experiment 3 reduces the viability of an alternative account related to mood states. First, as in the previous two experiments, it is difficult to account for the interactive pattern of results that we obtained in this experiment with the mood explanation. Furthermore, the measures of mood states we obtained before the puzzle solving task revealed that participants' mood was not different across the various conditions.

This study suggests the possibility that placebo effects of marketing actions could create ethical dilemmas. For example, a marketer may falsely claim that a product offers a particular benefit, or similarly, a marketer could repackage a product and significantly increase its price, suggesting (explicitly or implicitly) that the higher cost of the cosmeti-

cally different product is justified by its greater efficacy. Because of placebo effects of marketing actions, consumers' misplaced beliefs in such seemingly baseless claims may paradoxically make those claims partly true; indeed, given that unlike false statements, puffery is often considered acceptable, even modest placebo effects may make false claims legitimate.

GENERAL DISCUSSION

Marketing actions can have powerful perceptual effects (e.g., Allison and Uhl 1964; McClure et al. 2004). For example, cola can taste different when a person knows it is "the real thing" (i.e., a Coke) from the same product when it is mislabeled as a generic brand. More generally, it is widely known that marketers can significantly influence variables such as (perceptions of) consumption experiences and purchase behavior. This article extends the scope of effects that marketing actions are known to be capable of evoking, showing that such actions can also influence the actual efficacy of a marketed product. For example, we found that participants who consumed an energy drink purported to improve mental acuity that they purchased at a discounted price subsequently performed worse on a puzzle-solving task than did equivalent participants who purchased the same drink at its regular price.

We provide evidence that the effect of the documented marketing actions is mediated by expectations. For example, in Experiments 1, 2 and 3, we show that varying the strength of response expectancies affects the magnitude of the effect. Specifically, in Experiment 1, we show that performance (after a participant consumed an energy drink he or she purchased at a discount) was worse when the expectations related to the drink's efficacy were strengthened than when they were not. In Experiment 2, drawing participants' attention to their beliefs about the price–efficacy link weakened their beliefs (some respondents presumably realized that the beliefs may not be applicable to that situation) and, thus, the magnitude of the effect. Experiment 3 revealed that strengthening response expectancies by presenting strong advertising claims enhanced the magnitude of the basic effect. Across the three experiments, we also rule out several alternative accounts, such as those relating to cognitive dissonance, distraction, and mood states. Our findings also suggest that the process by which expectations lead to the observed effects occurs nonconsciously.

The effect we document is akin to placebo effects in medicine. We contribute to the placebo literature by extending the types of features that are known to evoke such effects from those that are inherent to the placebo (e.g., information about the placebo, the substance/treatment it replaces, how a placebo is administered) to price, a feature that is not inherent to the placebo. Given placebo researchers' interest in when placebo effects occur nonconsciously, it is also significant that we found that the process by which expectations lead to the placebo effects occurs nonconsciously.

Our findings extend what is known about the association between price and quality in a significant way, showing that price affects not only perceived quality but also actual quality (i.e., the actual efficacy of the product). Indeed, the effect we found and its dependence on expectancies shed light on a puzzling disparity between two conclusions of the

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large body of research on the relationship between price and quality (see Bettman, John, and Scott 1986; Gerstner 1985; John, Scott, and Bettman 1986). On the one hand, there is vast empirical evidence that consumers often perceive lower-priced products and services to be of lower quality, especially if they have no simple alternative way to assess quality (Rao and Monroe 1989). On the other hand, in general, investigations of the relationship between price and objective indications of quality, such as *Consumer Reports* ratings, arrive at a different conclusion. For example, Riesz (1979) examines the correspondence between prices and indications of objective quality from *Consumer Reports* for 679 brands in 40 packaged food product classes over a 15-year period. He concludes that the correlation was near zero, and in cases such as frozen foods, it was even negative. More generally, such investigations conclude that the empirical relationship between those two variables is weak at best (Gerstner 1985). Why would consumers perceive the relationship between price and quality to be significant when, in general, it is not so? An explanation that is implied by our research for this discrepancy may be a self-fulfilling nature of consumer expectations. Such expectations may lead lower-priced products to perform worse, regardless of whether their objective indications of quality (research of the type that *Consumer Reports* examines) are actually worse. In other words, the well-known cliché that "one gets what one pays for," may have more merit than has been believed. Exploring this is a worthwhile direction for further research.

A related direction for further research is to delve deeper into why we observed only undesirable placebo effects related to discounted prices in Experiments 1 and 2. Our findings in Experiment 2 suggest that one reason that could account for our results is that people normally focus on self-efficacy beliefs in tasks such as solving puzzles but partly shift their focus away from their own abilities toward beliefs about external stimuli when they are presented with a performance enhancer such as SoBe. An interesting research question is, Can being offered a performance enhancer lower expectations about or the salience of a person's abilities and, thus, potentially lead to diminished performance (particularly if beliefs about the efficacy of the product are not as strong as the self-efficacy beliefs)?

We believe that another promising direction for further research is to demonstrate additional situations in which marketing actions have placebo effects. For example, replicating our results with price promotions on medical products is another worthwhile direction for further research, and there would be considerable implications for the marketing of such products and for public policy. As a first step in this direction, we conducted a small preliminary study. We asked undergraduate marketing students to maintain diaries of when they caught a cold over the course of a semester and used an over-the-counter medication (i.e., a prescription was not necessary) to treat the symptoms. At the end of the semester, 29 students who had fallen ill during the semester and who had bought national over-the-counter brands indicated how effective the medication they had bought was in treating their symptoms on a scale that ranged from 1 ("not at all") to 7 ("very"). In a separate question, we asked them to indicate whether they had bought the medication at its regular price or at a discounted

price. Consistent with a placebo effect of price discounts, the 16 students who had bought their medication at a discounted price rated the effectiveness of the medication to be lower (M = 3.6) than the 13 students who had bought their medication at the regular price (M = 5.5; $F(1, 27) = 18.8$, $p < .01$).

More generally, it seems reasonable to speculate that marketing decisions ranging from product features, such as color and texture, to marketing-mix decisions, such as advertising messages and distribution channels, may influence the physical effectiveness of the products to which they are applied. If this is the case, the implications could be immense. As an admittedly speculative possibility, if two consumers purchase the same car but one does so at a substantial discount, the two consumers may drive differently. A possible result could be that the consumer who purchases the car at a discount is more accident-prone. Alternatively, if two consumers purchase the same car but only one is exposed to advertising messages that stress the safety benefits of the car, the possible result could be that the consumer exposed to the advertising drives differently than the other consumer. Further research should carefully examine such possibilities.

Another worthwhile research direction is to identify additional moderators of the effect. Beyond the obvious theoretical importance, this would also be significant from a practical viewpoint because it might help reduce or even eliminate undesirable placebo effects (as we did in Experiment 2) in such cases as selling subsidized medications to consumers. For example, will a delay between consumption of a health-related product and subsequent engagement in a task (see Nowlis, Mandel, and McCabe 2004) diminish the magnitude of the placebo effect we document? An investigation of such questions will help identify boundary conditions, shed more light on the underlying process, and explore the scope of placebo effects on marketing actions.

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Exhibit 8

[Annual Meeting Abstracts]

PSYCHOPHYSIOLOGICAL EFFICACY OF A 2% AMINOPHYLLINE-BASED THIGH REDUCING CREAM.

Marks, B. L. FACSM; Katz, L. M.; Brown, D. L.; D'Angelo, A.

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Abstract 1019

Aminophylline-based creams are marketed as fat reducing agents for the thighs. The purposes of this study were to determine if: 1) a thigh reducing cream would influence body image, 2) product price would influence perception of effectiveness and, 3) the product would decrease thigh size. Serving as their own control, 11 women with thigh cellulite were randomly assigned to a double-blinded, counterbalanced cream treatment with 2% aminophylline (A) on one leg and a placebo (P) on the other (age: 26±7 yrs.; BMI: 23±2 kg/m^2; Body Fat (BF): 24±4%; VO2: 39±4 ml/kg/min). They were also randomly assigned into a fictitious expensive (E) or inexpensive (I) cream treatment group. In the lab, subjects massaged 4.5 g of either A or P cream for 1 min into each thigh 5 d/wk for 6 wks. Pre/post testing was done 1 wk prior and immediately after the 6 wk intervention. Dependent measures included thigh girth and skinfolds (distal, mid, proximal to patella) and psychological indices (mood, body image, rating of effectiveness). Results: No significant differences (NSD) were found at baseline between the E vs. I groups for VO2, %BF, or BMI (Independent T's, p>.20). NSD were found for the right vs. left thigh measures at baseline, nor for pre-post measures of VO2, %BF, or BMI (Paired T's, p>.22). NSD were found for skinfold and girth measures between A vs. P-treated thighs (Paired T's, p>.10). Subjects in both the E and I groups reported improved thigh image (Friedman 2-way ANOVA, p=.046), but neither the E nor I group were influenced by product cost (Mann-Whitney U-Wilcoxon Rank Sum Test, p>.17). Conclusions: The 2% A cream was not effective in reducing thigh size, however, the subjects felt more positive about their thighs and overall body build. (Partially supported by FAU Foundation)

Section Description

American College of Sports Medicine; 46th Annual Meeting; Washington State; Convention & Trade Center; June 2-5, 1999

D-40 POSTER PSYCHOBIOLOGY

Exhibit 9

Short Article

Imagining thin: Why vanity sizing works

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Abstract

Vanity sizing, the practice of clothing manufacturers, whereby smaller size labels are used on clothes than what the clothes actually are, has become very common. Apparently, it helps sell clothes—women prefer small size clothing labels to large ones. We propose and demonstrate that smaller size labels evoke more positive self-related mental imagery. Thus, consumers imagine themselves more positively (thinner) with a vanity sized size-6 pant versus a size-8 pant. We also show that appearance self-esteem moderates the (mediating) effect of imagery on vanity sizing effectiveness—while vanity sizing evokes more positive mental imagery for both low and high appearance self-esteem individuals, the effect of the positive imagery on clothing preference is significant (only) for people with low appearance self-esteem, supported by the theory of compensatory self-enhancement.

Our suggestion of simple marketing communications affecting valence of imagery and consequent product evaluation have implications for many other marketing domains.
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Keywords: Vanity sizing; Visual imagery; Self-esteem

A person's body image is an important source of self-esteem (Smeesters, Mussweiler, & Mandel, 2010). This is especially predominant among women—approximately 50% of girls and young women report being dissatisfied with their bodies (Bearman, Presnell, Martinez, & Stice, 2006). A model-thin body is now considered an ideal that every woman should admire and achieve (Wertheim, Paxton, Schutz, & Muir, 1997). The weight loss industry has grown tremendously over the last couple of decades with consumers, presented with idealized advertising images, trying to get thinner and thinner.

Body image is not simply a mirror-like reflection of external reality. Although the body concept includes objective physical attributes, its contents and associated positive or negative interpretations are highly subjective and influenced by one's environment (Phillips & de Man, 2010). Realizing the subjective nature of body image and the everlasting desire of female consumers to get thinner, managers for clothing companies have found a simple way of transforming a size-8 woman into a size-6: 'vanity sizing,' a strategy used by many clothing companies today. In this strategy, women's apparel companies intentionally label a garment smaller than its true size. The practice is especially common in higher-end apparel (Kinley, 2003a). Kinley (2003b) examined over 1000 pairs of women's pants, and found, for instance, that the measurement for pants listed as size-6 ranged from 21 to 35 in for crotch seams (measured from the top of the waistband in the front to the top of the waistband in the back). Contending on the notion that thinner is better for today's women exposed to idealized thin images constantly, we propose that vanity sizing is used as a means to generate "positive" *self-related* mental imagery, which in turn improves attitudes toward the product.

Through two studies, we demonstrate that mental imagery is more positive with vanity sizing—consumers imagine themselves more positively (e.g., thinner, more attractive) when a clothing item with a smaller size label fits them; thus, a vanity sized size-6 pant evokes more positive self-related imagery for a woman than a size-8 pant. We also show that appearance self-esteem moderates the (mediating) effect of imagery on vanity sizing effectiveness—while vanity sizing evokes more positive mental imagery for *both* low and high appearance self-esteem individuals, the effect of the positive imagery on product evaluation is significant only for people with low appearance self-esteem, supported by the theory of compensatory self-enhancement.

Why does vanity sizing evoke more positive mental imagery?

Mental imagery

Imagery has been described as "a process by which sensory information is represented in working memory" (MacInnis & Price, 1987). Imagery and discursive processing have been studied as the two conceptually distinct modes of information processing (Oliver, Robertson, & Mitchell, 1993). While discursive processing inquires how language and symbols are manipulated in working memory to perform some function, imagery is seen as a conceptually distinct way of representing information (MacInnis & Price, 1987), and has been defined as "a mental event involving visualization of a concept or relationship" (Lutz & Lutz, 1978).

The process of mental imagery has been studied extensively in psychology and consumer behavior, focusing on its various antecedents, moderators, and consequences (MacInnis & Price, 1987). Most imagery research in psychology has focused on imagery's ability to enhance learning and memory (e.g., Anderson, 1978; Elliott, 1973; Peterson & McGee, 1974). Within consumer behavior research, imagery has been examined in several marketing contexts, including advertising effectiveness (Edell & Staelin, 1983), preference formation (Bone & Ellen, 1992; Miller & Marks, 1997), attitude development (Kisielius & Sternthal, 1984), anticipatory satisfaction with an experience (MacInnis & Price, 1990; Shiv & Huber, 2000), new product evaluations (Dahl & Hoeffler, 2004; Zhao, Hoeffler, & Dahl, 2009), and experiences in virtual shopping environments (Schlosser, 2003).

Building on these demonstrated positive effects of increased mental imagery on consumer responses in various contexts, research has focused on identifying strategies for evoking greater and more effective mental imagery through marketing communications. Three main strategies have been studied in depth in relation to their propensity of eliciting imagery: use of *pictures* or *concrete words* within the marketing communications, and explicit use of *instructions to imagine* given to respondents. As such, the effects of using various pictorial stimuli (e.g., Babin, Burns, & Biswas, 1992) and verbal stimuli in the form of individual concrete words (e.g., Babin & Burns, 1997) and instructions to imagine (e.g., Miller & Marks, 1997) have

been established with regard to their ability to generate mental imagery and to influence consumer attitudes. Hung and Wyer (2011) have stressed the need for identifying and studying more subtle techniques of imagery generation where consumers would spontaneously imagine themselves using the product. A focus on subtle techniques is warranted in order to make such strategies more readily and widely applicable in the marketplace, as well as to increase their authenticity. Furthermore, spontaneous and natural generation of imagery would circumvent the taxing nature of advertiser-imposed imagery tasks on available cognitive resources as demonstrated in previous research (Bolls & Muehling, 2007). Accordingly, in this paper, we focus on size labeling as a subtle strategy of eliciting imagery as opposed to including explicit instructions or additional visual support.

Lutz and Lutz (1978) indicate that "the power of the human imagination is vast and may supersede any advertiser-provided stimulus in being personally relevant or vivid to the consumer". Thus, mental images formed by consumers themselves (i.e., self-generated imagery) may be much more powerful than illustrations. They would also be more personally relevant since they will be anchored in the person's own experience base and generated by her own mental processes (as opposed to mental processes based on advertiser-imposed pictures or instructions to imagine specific situations).

Some scholars believe a 'positivity bias' is associated with imagery because people are disinclined to fantasize about negative outcomes, and note that imagery processing is likely to pertain to pleasant emotional or affective elements of the stimulus (e.g., Bone & Ellen, 1992; MacInnis & Price, 1987). More specifically, building on 'self-positivity bias', which indicates that most individuals possess a very positive view of the self (Lin, Lin, & Raghubir, 2003), it can be argued that positivity bias would be even more pronounced in the case of *self-related* mental imagery (i.e., consumers' visualization of the self in product purchase, trial, or usage situations). This reasoning would suggest that self-relatedness will facilitate the generation of more favorable mental imagery based on self-positivity bias. Miller and Marks (1997) further indicate that the favorableness of the resulting attitude depends on the *valence* of the mental imagery generated. Thus, individuals should form favorable attitudes towards stimuli that evoke more positive self-related mental imagery, especially when the mental images are naturally and spontaneously formed by the consumers themselves in response to subtle marketing communication strategies.

Appearance self-esteem

Physical attractiveness is an attribute of inherent value to mankind (Bloch & Richins, 1992). Decades of research in social psychology have confirmed that physical attractiveness is positively related to social power and self-esteem (Adams, 1977; Edmonds & Cahoon, 1984; Goldman & Lewis, 1977). Especially for women, body image is an important source of self-esteem (Smeesters et al., 2010). Because society equates thinness with beauty and attractiveness in women, it is not surprising that women tend to be preoccupied with losing weight

and achieving a slim physique at young ages (Vaughn & Langlois, 1983). Rosen and Gross (1987) report that by adolescence, 63% of girls, compared with 16% of boys, are already trying to lose weight. As such, there is an overall notion of 'thinner is better'. Thus, there is an internal motivation to feel thin, such that vanity sizing (i.e., possibility of fitting into a smaller size garment which insinuates the conception of thinner) can generate *positive* self-related imagery for female consumers. Hence, we propose that:

H1. Vanity sizing will generate more positive mental imagery than normal sizes.

Furthermore, research on the positive effects of imagery on consumer responses and self-positivity bias discussed earlier suggests that higher positive self-related imagery should then affect consumer attitudes toward the product. But, would the effect of vanity sizing depend on how a consumer perceives herself? Yang, Zhang, and Peracchio (2010) note the need to study attitude formation and persuasion through a general framework that incorporates both message factors (e.g., vanity sizing in our case) and message processor factors (e.g., consumer self-concept or self-esteem).

Self-enhancement, the motive to elevate positive self-concept, has been suggested to be a central goal of existence (Allport, 1937; Swann, Pelham, & Krull, 1989). People are motivated to feel good, to create and maintain generally pleasant or positive subjective states (Larsen, 2000). This would suggest that individuals would be motivated to maintain/improve their self-esteem, and in turn, process incoming information accordingly. This is in line with *simple self-enhancement* theory, which posits that all people strive systematically to promote their self-concept and the perception that others think well of them. More specifically, however, *compensatory* or *defensive self-enhancement* theory suggests that since people with negative self-concepts rarely receive positive feedback, they make compensatory efforts to win the favor of others. It assumes that people with negative self-views are more motivated to self-enhance than are people with positive self-views (Swann et al., 1989). Thus, although all consumers are motivated by simple self-enhancement, consumers with low appearance self-esteem may be influenced *more* by the positive nature of the mental imagery generated through vanity sizing compared to consumers with high appearance self-esteem. Hence, we propose that:

H2a. Moderated Mediation. Positivity of mental imagery will mediate the effect of vanity sizing on product evaluation; however, this mediation will be moderated by consumer appearance self-esteem level. More specifically,

H2b. The effect of positivity of mental imagery on product evaluations will be larger for consumers with lower (versus higher) appearance self-esteem.

For consumers with high appearance self-esteem, the *direct* effect of vanity sizing on product evaluations also builds on theories of congruence between perceived self and the product.

It has been shown that the extent to which a product or a possession is perceived as congruent with the self-concept is a critical determinant of attitudes toward that product (Ferraro, Escalas, & Bettman, 2011; Sirgy, 1982). Accordingly, fitting into a vanity sized product is already harmonious with the self-worth of consumers with high appearance self-esteem, creating what Ferraro et al. (2011) call 'self-worth match'.

To clarify our hypotheses, we have proposed that H1 will hold for all consumers (vanity sizing generates more positive imagery than regular sizes, irrespective of self-esteem level). In H2a, we have proposed that there is an *indirect effect* between size and product evaluation through imagery (that is, imagery *mediates* the effect of size on product evaluation), and that this indirect route is moderated by self-esteem (*moderated mediation*). While this moderated mediation can stem from either (i) the effect from size to imagery depending on self-esteem, or (ii) the effect from imagery to evaluation depending on self-esteem, or both, in H2b, we have specifically proposed that it is (ii) and not (i). Our conceptual framework is presented in Fig. 1.

In more layman terms, we contend that individuals would form favorable attitudes towards marketing communications that generate positive self-related imagery. Since a thinner body is usually admired and strived for by females, imagining oneself fitting into a smaller-sized garment would trigger such positively valenced self-related imagery. We further propose that this positive imagery will make a bigger (positive) change to attitudes towards the clothing for lower (versus higher) self-esteem consumers—since the positive self-related mental imagery is likely to enhance the feelings of self-worth more.

Study 1

Methodology

Design

A one-way, 3-level (product size: smaller than, larger than, vs. same as respondent's usual size) between-subject design was used for this experiment, and appearance self-esteem of the respondent was measured. Since research shows physical esteem to be more important for women (Rosen & Gross, 1987), we used seventy-nine female undergraduate students for the experiment.

Stimuli and procedure

Subjects were presented with the following scenario. The only thing that varied between the conditions was the size assigned to the target product.

"Please imagine that you are out shopping for a pair of jeans. You visit a clothing store where you have made a couple of purchases before and were satisfied with the products. You try on various styles of jeans and make a decision on one. This is a relatively new style with a different cut than the jeans you currently have. The size that fits you the best ends up being *one size smaller* (vs. higher vs. same as) than your usual size."
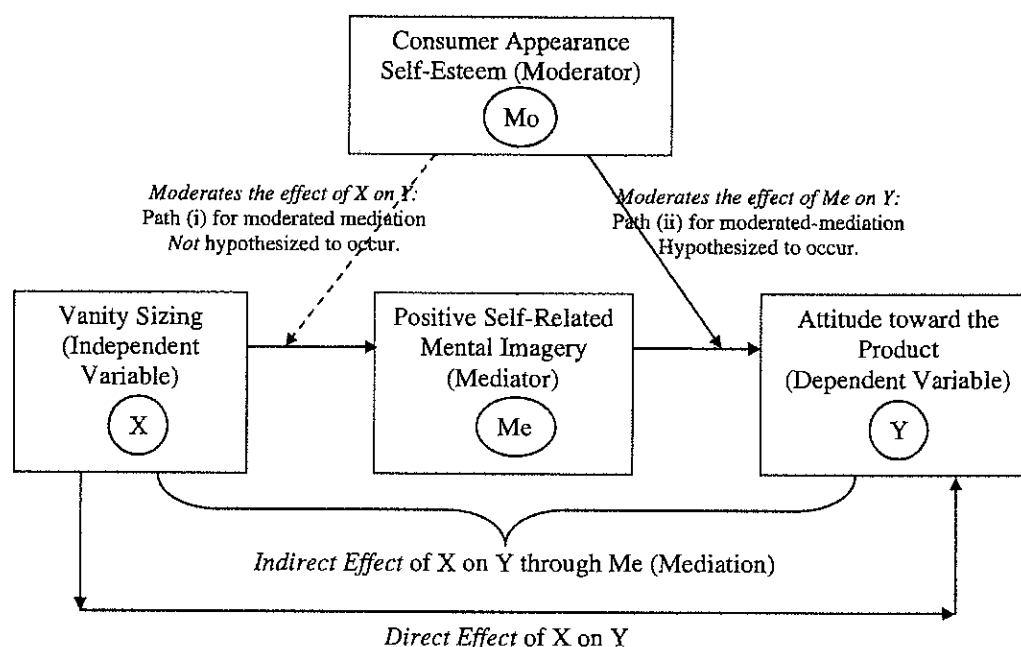
Fig. 1. Conceptual framework—moderated mediation model for vanity sizing, imagery, product evaluation, and self-esteem.

After reviewing the scenario, subjects responded to a set of questions measuring their attitudes and self-related mental imagery generated, together with measures on appearance self-esteem and some control questions.

Measures

Attitude-toward-the-product, the dependent variable, was measured using a three-item scale with seven-point semantic differential questions anchored at 'negative' and 'positive'(-Cronbach's Alpha=.78). A two-item scale was developed for measuring positive self-related mental imagery, specific to the context of vanity sizing. Respondents rated their agreement with two positive statements (I pictured myself thinner; I pictured myself more attractive), on a seven-point scale, anchored at 'strongly agree' and 'strongly disagree' ($r(77)=.56, p<.01$). Finally, consumer appearance self-esteem was measured by using the six-item scale developed by Heartherton and Polivy (1991) (Cronbach's Alpha=.82).

Results and discussion

We expect that the 'smaller size' presentation would generate higher positive imagery (per H1) compared to the 'larger size' and 'same size' presentations; and that imagery will mediate the effect of size on product attitude, but that this mediation will be moderated by self-esteem (H2a); further, imagery will have a larger effect on product attitude for lower (vs. higher) self-esteem subjects (H2b).

Imagery

An ANCOVA with positive self-related mental imagery as the dependent variable and product size (smaller, larger, vs.

same as) as the independent variable, and respondent's appearance self-esteem as a covariate, revealed a significant main effect for product size ($F(1,75)=7.05; p<.01$); self-esteem was not significant ($p>.2$) indicating that vanity sizing affects imagery regardless of self-esteem level of consumers, consistent with our conceptualization. Planned contrasts including self-esteem as a covariate, showed that the message with a 'smaller size' presentation results in significantly improved imagery compared to both the 'larger size' and 'same size' presentations ($M_{smaller}=4.56$; $M_{larger}=3.48$; $t_{smaller-larger}=-3.72$, $p<.01$; $M_{same}=3.90$; $t_{smaller-same}=2.23$, $p<.05$).

While we focus on the effect of vanity sizing (i.e., the smaller size), we also did contrasts between the larger and same as (control) cells. They were not significantly different from each other ($p>.2$). This is in accordance with our conceptual development. Self-positivity bias and favorability of imagery would suggest that people do not generate imagery detrimental to their self-worth.

Moderated mediation analyses

To test for moderated mediation (H2a) and path (i) versus (ii) for moderated mediation, we conducted three sets of equations per Muller, Judd, and Yzerbyt (2005; see also cf. model 5 Preacher, Rucker, & Hayes, 2007). Since the model they propose requires two levels of the independent variable, and since we did not have a significant difference between the larger and same as sizes in imagery, for simplicity, we focus on the 'smaller' and 'larger' size conditions of product size.[3] The values of

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[3] In Study 2, we use the 'smaller' and 'same as' size conditions.

the independent variable were contrast coded. Also, the continuous variables appearance self-esteem (moderator) and positive self-related mental imagery (mediator) were centered at their mean in order to increase the interpretability of various parameters in the equations that include interaction terms (Aiken & West, 1991; Muller et al., 2005). The results are reported in Table 1.

A *first equation* regressed product size (X), appearance self-esteem (Mo), and the interaction between product size and appearance self-esteem (X*Mo) on attitude-toward-the-product (DV). This equation showed a significant effect only for product size on the dependent variable ($\beta = -.57$, $t = -5.33$, $p < .01$) which is the *direct effect* of product size on attitudes; the other variables were not significant ($ps > .6$). Not getting a significant effect for X*Mo also implies that the *direct effect* of size on attitude is not moderated by self-esteem. A *second equation* included the same factors, but these were now regressed on positive self-related mental imagery (Me). Again, only the independent variable, product size (X) was significant ($\beta = -.41$, $t = -3.37$, $p < .01$; other $ps > .2$), indicating that both low and high self-esteem individuals have greater imagery with smaller sizes. Note that the interaction of size and self-esteem not being significant in explaining imagery also rules out path (i) for moderated mediation. A *third equation* added the mediator (positive self-related mental imagery—Me) and the interaction between the mediator and the moderator (MoMe) to the original model used in the first equation. As before, product size was significant ($\beta = -.56$, $t = -4.60$, $p < .01$), but so was the interaction of self-esteem and imagery (MoMe; $\beta = .29$, $t = 2.08$, $p < .05$) supporting path (ii)—thus, the partial effect of mental imagery on product attitudes depends on the respondent's appearance self-esteem. No other variables were significant ($ps > .1$) for this third equation. This shows that the potency of the mediating process depends on the moderator, that is, across the three equations, all requirements of the moderated mediation model are met for path (ii). Thus, H2a and path (ii) are supported; path (i) is not supported.

This mediation analysis, however, does not inform us whether imagery does indeed have a stronger mediating effect for low self-esteem consumers compared to high self-esteem consumers on product attitude as we proposed (H2b). In order to test this, we performed a 'spotlight'

analysis (Aiken & West, 1991; Fitzsimons, 2008; Irwin & McClelland, 2001). Accordingly, we mean-shifted the appearance self-esteem data up or down one standard deviation. The spotlight analysis at one standard deviation below the mean showed a positive and significant effect of the mediator on product attitudes for low self-esteem consumers ($\beta = .419$, $t = 2.07$, $p < .05$). However, the spotlight analysis at one standard deviation above the mean did not yield a significant effect of the mediator on product attitudes for high self-esteem consumers ($p > .2$). Together, these results indicate that the mediating effect of positive self-related imagery on product attitudes is larger for consumers with lower appearance self-esteem compared to high self-esteem consumers, supporting H2b.

Discussion

Our results suggest that vanity sizing enhances positive mental imagery, irrespective of self-esteem level. However, while the positive imagery significantly impacts attitudes for low self-esteem consumers, it does not do so for high self-esteem consumers. This implies that imagery mediates the effect of vanity sizing on attitudes for low but not high self-esteem consumers (i.e., self-esteem moderates the mediating effect of imagery). Since mediation is considered an indirect effect (Zhao, Lynch, Chen 2010; also see Fig. 1), this is the same as saying that the indirect effect of vanity sizing on attitudes through imagery is moderated by self-esteem. Differing results for high and low self-esteem customers are consistent with compensatory self-enhancement theory whereby low self-esteem customers need that extra lift in self-image and may get it from a product label. The results also suggest that vanity sizing has a *direct effect* on product attitudes for all consumers, irrespective of self-esteem level. This direct effect validates the existence of vanity sizing and the common belief that "it works".

While the study supports all our hypotheses, there can be concerns about our measurement of self-esteem *following* the product size manipulation (telling subjects which size jeans they fit into)—that is, the size manipulation may also have impacted self-esteem. Therefore, in the next study, we measure appearance self-esteem *before* the respondents are given the vanity sizing scenario. Note, however, that measuring self-esteem first can also prime it and impact the effect of

Table 1
Study 1 results: Summary of regressions for moderated mediation test.

Predictor	Equation 1: Product attitude			Equation 2: Positive self-related mental imagery			Equation 3: Product attitude		
	Beta	t	Sig	Beta	t	Sig	Beta	t	Sig
X product size	−.57	−5.11	.00[+]	−.41	−3.37	.00[+]	−.56	−4.60	.00
Mo appearance self-esteem	−.06	−.49	.63	.16	1.29	.20	−.10	−.86	.39
XMo interaction	.04	.34	.73[−]	.11	.88	.38	.20	1.46	.15
Me positive self-related mental imagery							.11	.92	.36
MeMo interaction							.29	2.08	.04[+]

Note: Bold and ([+]) sign indicates that the beta needs to be significant for our proposed moderated mediation model; bold and ([−]) indicates that the beta should not be significant for our proposed moderated mediation model.

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vanity sizing. Thus, in the new study, self-esteem is measured under the guise of another experiment and the vanity size manipulation is done after a substantial time delay and other tasks between self-esteem measurement and our main experiment. The two studies together should be a strong demonstration of the vanity sizing phenomenon and its explanation, since Study 1 circumvents possible priming concerns of collecting self-esteem measures first, and Study 2 circumvents the possible confounding of self-esteem measures with the product size manipulation.

Study 2

Methodology

Design and procedure

We used a similar design to Study 1 with the same jeans scenario in this second experiment, where subjects were presented with a shopping scenario with different size manipulations of a pair of jeans. However, we focused only on the smaller than (vanity sizing) and the same as (control) conditions. So, we have a one-way, 2-level (product size: smaller than vs. same as respondent's usual size) between-subjects design and we measure appearance self-esteem *before* our main experiment. Ninety-four female undergraduate students participated in the experiment for course credit.

Measures

To be able to keep the results of the two studies comparable for interpretation, we used the same measures here as in Study 1. Accordingly, attitude-toward-the-product was the dependent variable (3-item scale, Cronbach's Alpha=.88), positive self-related mental imagery was the mediator (2-item scale, $r(92)=.46$, $p<.01$), and respondent appearance self-esteem level was the moderator (6-item ASE scale, Cronbach's Alpha=.78).

Results and discussion

Moderated mediation analyses

We again conducted three sets of equations per Muller et al. (2005), following the necessary transformations. The results are reported in Table 2.

The *first equation* regressed product size (X), appearance self-esteem (Mo), and the interaction between product size and appearance self-esteem (X*Mo) on attitude-toward-the-product (DV). This equation showed a significant effect only for product size on the dependent variable ($\beta=-24$, $t=-2.29$, $p<.05$); the other variables were not significant ($ps>.4$). These results support the *direct effect* of product size on attitude and also show that it is not moderated by self-esteem (X*Mo is not significant). The *second equation* regressed the same variables on positive self-related mental imagery (Me). Only the independent variable, product size (X) was significant ($\beta=-.34$, $t=-3.38$, $p<.01$; other $ps>.5$), indicating that both low and high self-esteem individuals have greater imagery with smaller sizes (supporting H1). The interaction between product size and self-esteem (X*Mo) not being a significant predictor of imagery rules out path (i) for moderated mediation. Finally, a *third equation* included the mediator (positive self-related mental imagery—Me) and the interaction between the mediator and the moderator (MoMe) to the original model used in the first equation. Product size was significant ($\beta=-.22$, $t=-2.08$, $p<.05$), and so was the interaction of self-esteem and imagery (MoMe; $\beta=.23$, $t=2.15$, $p<.05$) supporting path (ii)—thus, the partial effect of mental imagery on product attitudes depends on the respondent's appearance self-esteem. No other variables were significant ($ps>.4$) for this third equation. This shows that the strength of the mediating process depends on the moderator, that is, across the three equations, all requirements of the moderated mediation model are met for path (ii). Thus, H2a and path (ii) are supported; path (i) is not supported, replicating Study 1.

The spotlight analysis (Aiken & West, 1991; Fitzsimons, 2008; Irwin & McClelland, 2001) at one standard deviation below the mean showed a positive and significant effect of the mediator on product attitudes for low self-esteem consumers ($\beta=.345$, $t=2.11$, $p<.01$). However, the spotlight analysis at one standard deviation above the mean did not show a significant effect of the mediator on product attitudes for high self-esteem consumers ($p>.3$). Together, these results indicate that the mediating effect of positive self-related imagery on product attitudes is larger for consumers with lower appearance self-esteem compared to high self-esteem consumers, supporting H2b. This, once again, replicates the results of Study 1, with vanity sizing specifically tested against the control

Table 2
Study 2 results: Summary of regressions for moderated mediation test.

Predictor	Equation 1: Product attitude			Equation 2: Positive self-related mental imagery			Equation 3: Product attitude		
	Beta	t	Sig	Beta	t	Sig	Beta	t	Sig
X product size	−.24	−2.29	.02[+]	−.34	−3.38	.00[+]	−.22	−2.08	.04
Mo appearance self-esteem	.09	.84	.40	.01	.08	.94	.05	.50	.62
XMo interaction	.01	.08	.94[−]	.06	.60	.55	.06	.57	.57
Me positive self-related mental imagery							.08	.70	.48
MeMo interaction							.23	2.15	.03[+]

Note: Bold and (+) sign indicates that the beta needs to be significant for our proposed moderated mediation model; bold and (−) indicates that the beta should not be significant for our proposed moderated mediation model.

condition (smaller than vs. same as respondent's regular size), and with appearance self-esteem measured before the main experiment.

Conclusion

Two studies provide a consistent explanation for why vanity sizing works. We find that fitting into a pair of jeans labeled smaller than its true size can increase positive self-related mental imagery for consumers, irrespective of their self-esteem level. The studies also demonstrate the influence of individual appearance self-esteem on the mediating effect of mental imagery. Specifically, we demonstrate a mediating effect of positive self-related mental imagery (for the effect of marketing communications on consumer evaluations) for consumers with low self-esteem, but not high self-esteem. This is consistent with low self-esteem consumers using external stimuli to boost their self-worth in line with *compensatory self-enhancement* theory.

We also find a direct effect of vanity sizing on product attitudes for all consumers, regardless of self-esteem level, which lends credence to the common belief that vanity sizing works. There can be many reasons for this direct effect, for instance, bragging rights ("I wear a size 4!) or enhancement of self-perception merely by purchasing a "thinner" size. This is also in line with *simple* self-enhancement theory, which posits that all people strive systematically to promote their self-concept.

The desire to be beautiful, when combined with personal values and social comparison, originates a self-perception about one's appearance (Abdala, Ricardo, Rossi, & Alberto, 2008), which is an integral part of self-concept. Frequent media exposure may cause consumers to cultivate unrealistic perceptions about the prevalence of desirable attributes such as physical ideals (Smeesters et al., 2010). When comparing the self-concept with the beauty ideals, women generally see a difference that causes dissatisfaction and preoccupation (Abdala et al., 2008). In this perspective, consumption is a way to reduce the distance between the self and ideal of beauty (Watson, Rayner, Lysonski, & Durvasula, 1999) by changing the impression made on others or on oneself. In this paper, we demonstrate (and explain the process of) such a phenomenon, vanity sizing, which is effective on low self-esteem consumers because it is in line with compensatory self-enhancement motives. We did not collect before-and-after self-esteem measures simultaneously in this research, which could be a good area of investigation, to see whether exposure to such marketing activities do indeed improve consumer self-perceptions over time or for that instance. In other words, our explanation rests on the effectiveness of positive self-related mental imagery; however, exploring the more enduring consequences of this positivity of imagery on consumer self-perceptions could be a viable research venue. Recent research, which provides a more nuanced view of attitude and preference as driven by a liking component and a more motivational reward component (Berger & Shiv, 2011), can shed further light into such inquiries. Investigating whether positive self-related mental imagery exhibits motivational reward characteristics can further clarify the processes of how it affects consumer behavior ("I wear a size 4!").

Both in our conceptual development and in our experimental designs, we tried to keep our context as simple and as clean as possible. However, studying the variables that could potentially exacerbate or attenuate the effectiveness of vanity sizing could be another possible research area. For instance, a priming manipulation that would heighten the importance of body image could plausibly increase the effects demonstrated here. Similarly, individual difference variables, such as *physical vanity* might influence the processes studied here. Physical vanity has been operationalized as a "concern for physical appearance and a positive (and perhaps inflated) view of physical appearance" (Watson et al., 1999). It could be interesting to systematically inquire how physical vanity interacts with vanity sizing.

Another important area for future research is to see to what degree vanity sizing can be practiced before consumers can no longer generate improved images of themselves, or to see if such a boundary condition even exists. Another direction is to study vanity for men. Do men exhibit the same vanity effects? Lastly, while the practice of vanity sizing is limited to the clothing industry by definition, there is great scope to study vanity feedback in non-clothing industries—for instance, Wii Fit reports the consumer's fitness age based on their performance. Should Wii adopt "vanity-aging" to increase product preference?

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EXHIBIT 10

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UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK

FRANCESCO IANNACCO, on behalf of himself and all others similarly situated, Plaintiff, v. THE ESTEE LAUDER COMPANIES INC., and ARAMIS INC. Defendant.	Civil Action No.: **DECLARATION OF JERRY A. WHITTEMORE, IN SUPPORT OF CLASS ACTION COMPLAINT**

JERRY A WHITTEMORE, Pharm. D, declares pursuant to 31 U.S.C. $ 1746:

1.   I am Jerry Whittemore. I hold a doctorate from USC (Pharmacy 1959) and have been a California Registered Pharmacist since 1959 (Registered Licentiate 21221). Since approximately 1964, I have been a Supervisor of Drug Testing, Manager of Research and Development, Director of R&D, Vice President of Science and finally (last 17 years), the President of a Cosmetic/Pharmaceutical research laboratory. (Juniper Laboratories, Inc., Los Angeles).

2.   As an expert in pharmaceutical chemistry and biochemistry and as a research director for a large prescription dermatology firm (Stiefel Div. of Glasco), I have developed scores of dermatologicals, including SARNA. I have collaborated with multiple small, medium, and large firms to explore the most assertive claims they could legally and ethically make.

3.   I have studied at length the ingredients, advertising, promotion, and claims of Estee Lauder's MAX LS products. The promotional claims include:

- Max LS Eyelift claims it "Uses Sirtuin Technology, Fights aging."

- Max LS: "The proven anti-age skin system for men."

- Max LS has the promise: "immediately reduce the appearance of lines and wrinkles."

- Max LS: "dramatically de-puffs and reduces the look of dark circles."

4.   Sirtuin proteins have been heavily studied as a potential anti-aging agent. In short, it has been theorized that sirtuin activiaton can extend cellular life and reduce the effects of aging.

5.   Generally, sirtuin activation has been studied in one of two settings; either through calorie restriction or through orally dosed resveratrol. There is no other known and scientifically accepted mode of sirtuin activation.   In this case, I focus on the studies which center on resveratrol as a sirtuin activator as by nature a topical dermatological cannot impact calorie restriction.   For that reason, in my experience in the cosmetic and dermatological industry, I believe Estee Lauder's claims of sirtuin technology must implicate or seek to capitalize on the "buzz" surrounding the use of resveratrol.

6.   In my opinion the above claims of Estee Lauder's MAX LS are false and deceptive. My reasoning is informed by good and accepted scientific evidence and specifically the studies that follow:

A.   Zhao et al (Proc. Natl Acad. Sci. USA 101) describes how niacinamide and Sirtuin 2 may act the same as some model compounds in delaying the memory loss lesions of mice who have been fed a drug in the sirtuin class

(manufactured by the authors' client). This is a survey paper typical of those supporting topical sirtuin mitigators. It is does not touch on topical efficacy.

B. Barger, et al (Plos one 10.1371) tests oral resveratrol in mice. When resveratrol-treated mice (dosed orally) were compared to mice with calorie restriction, the oral resveratrol groups apparently mimic the glucose uptake in muscle and the life extension long associated in calorie restriction. They summarized: [resveratrol supplementation retarding aging through a reduction in oxidative damage] "has been postulated to be causal in both aging and a number of age-related diseases." His functional analysis states: "resveratrol did not impact well-known factors that are postulated to impact aging..." This is a typical survey paper on oral resveratrol. Not only does it show no interest (or even curiosity) in topical efficacy, it even qualifies its conclusions as having "been postulated."

C. Satoh et al studied the neurobehavior adaption to diet-restricting conditions. He studied the use of "microinjection" of gene affecting proteins into mice and studied orally given sirtuins and/or niaciamide-like compounds. He obtained, using microinjection and oral niacinamide compounds, "anti-aging similar to diet restriction." This typical survey paper on sirtuin mitigation mentions "oral diets" and "microinjection" of sirtuin or niacinamide-like compounds. It does not rationalize topical usage or topical efficacy.

D.   de Cabo, et al (co-PI, 2006-2008-Interventions Testing Program) studied resveratrol's effect on diet-induced obesity in Rhesus Macaques. De Crabo is a gerontologist at the National Institute on Aging in Baltimore. MD. His research indicates that resveratrol (dosed orally) may be as effective as diet restriction in fat macaques. He admits he did not study macaques who eat normallyand that he "can't prove" resveratrol extended the life of macaques. No evidence is presented for topical efficacy. In his conclusion he states he "can't prove this."

E.   Guarente et al (MIT Cambridge, Ma Professor of Biology) have published that sirtuins and calorie restriction "may significantly extend the life spans of yeast, earthworms, mice and possibly humans." This summary article makes no mention of topical usage in earthworms, much less humans.

F.   Jang et al (Science 275) was favorably impressed with topical resveratrol in the treatment of certain skin cancers. This singular peer review article on topical resveratrol has the narrow focus of skin cancer therapy. In no situation can this be "proven anti-age skin science."

G.   Valenzano et al (Current Biology 16: vol. p 296) summarized that "resveratrol, a natural phytoalexin found in grapes and red wine increases longevity in the short lived invertebrates Caenorhabditis elegans and Drosophila." Working with the "short lived seasonal fish Nothobranchius fuzeri with a maximum recorded lifespan of 13 weeks in captivity...resveratrol was added to the food starting in early adulthood and caused a dose-dependent increase in median and maximum lifespan."
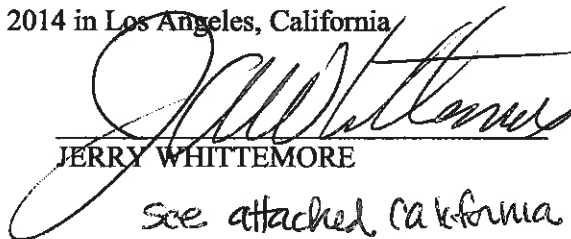
This typical paper on sirtuins and/or resveratrol oral administration is very valuable for studying oral administration. This typical paper is moot on topical therapy.

7. It is my opinion based on the studies cited above as well as the good and accepted scientific principles that there is no evidence to support the claim that Lab Series' MAX LS products "activate sirtuins" and that there is no evidence to support the claim that "sirtuin technology" has any impact on the signs of aging in the human skin.

8. Based on my experience in the cosmetic and dermatological industry it is also my opinion that resveratrol does not activate sirtuins when applied topically and thus does not offer any anti-aging benefits.

I declare under penalty of perjury pursuant to the laws of the United States, that the foregoing is true and correct.

Executed this 20th day of March, 2014 in Los Angeles, California

JERRY WHITTEMORE

See attached California Jurat
HiJung Lee (Notary public)

CALIFORNIA JURAT WITH AFFIANT STATEMENT
GOVERNMENT CODE § 8202

☒ See Attached Document (Notary to cross out lines 1–6 below)
☐ See Statement Below (Lines 1–6 to be completed only by document signer[s], *not* Notary)

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

_____   _____
Signature of Document Signer No. 1   *Signature of Document Signer No. 2 (if any)*

State of California

County of __LOS ANGELES__

<div>

HIJUNG LEE
Commission # 1973464
Notary Public - California
Los Angeles County
My Comm. Expires Apr 25, 2016

</div>

Place Notary Seal Above

Subscribed and sworn to (or affirmed) before me

on this __21__ day of __MARCH__, 20 __14__,
          Date   *Month*   *Year*

by

(1) __JERRY A. WHITTEMORE__

(2) _____
Name(s) of Signer(s)

proved to me on the basis of satisfactory evidence
to be the person(s) who appeared before me.

Signature _____
          Signature of Notary Public

——————————— OPTIONAL ———————————

Though this section is optional, completing this information can deter alteration of the document
or fraudulent reattachment of this form to an unintended document.

Description of Attached Document

Title or Type of Document: Civil Action. Declaration of JERRY A. WHITTEMORE, IN SUPPORT OF CLASS ACTION COMPLAINT. Francesco IANNACCO (Plaintiff) VS. THE GAGE LANDER COMPANIES

Document Date: __03/20/14__   Number of Pages: __5__

Signer(s) Other Than Named Above: _____

EXHIBIT 11

CARPENTER LAW GROUP

402 West Broadway, 29th Floor | San Diego, California 92101 | P. 619.347.3517 | Web: Carpenterlawyers.com

April 28, 2014

VIA CERTIFIED U.S. MAIL RETURN RECEIPT REQUESTED

The Estee Lauder Companies Inc.
C/o The Prentice-Hall Corporation System, Inc.
2711 Centerville Road, Suite 400
Wilmington, DE 19808

Re: Notice of Violation of California Consumer Legal Remedies Act

The Estee Lauder Companies Inc.:

Please be advised that we represent Behrad Manouchehri, who purchased Estee Lauder's MAX LS Age-Less Face Cream. We send this letter under the California Consumers Legal Remedies Act, California Civil Code Section 1750 et seq. ("CLRA"), to notify The Estee Lauder Companies Inc. that its sale of Lab Series MAX LS products with illegal misrepresentations on the product packaging violates the CLRA and to demand Estee Lauder rectify its violations within 30 days of receipt of this letter.

Estee Lauder has sold false and deceptively labeled Lab Series products to Mr. Manouchehri and other consumers in violation of California Civil Code § 17500 and § 17200. Estee Lauder has misrepresented to Mr. Manouchehri and consumers that MAX LS products utilize resveratrol, "sirtuin technology" and the "molecular age-less complex" to "erase the signs of aging" (among other claims) when, in fact, resveratrol, "sirtuin technology," and this "molecular age-less complex" do not provide the benefits promised. As a result, Mr. Manouchehri and other consumers have received a product that is something other than what is represented on MAX LS packaging and through Estee Lauder's extensive marketing campaign.

Accordingly, we demand that within thirty (30) days of receiving this letter, Estee Lauder agree to (1) refrain from engaging in the deceptive practices described above at any time in the future; and (2) return all money Estee Lauder's customers paid for MAX LS. If Estee Lauder refuses to provide the demanded relief within thirty (30) days, we will seek compensatory and punitive damages, statutory damages, injunctive relief, restitution, and any other appropriate equitable relief.

We hope to confer with you to resolve these violations. I look forward to hearing from you.

Very Truly Yours,

/s/ Todd D. Carpenter
Todd D. Carpenter

▤ CARPENTER LAW GROUP

402 West Broadway, 29th Floor | San Diego, California 92101 | P. 619.347.3517 | Web: Carpenterlawyers.com

April 28, 2014

VIA CERTIFIED MAIL RETURN RECEIPT REQUESTED

Aramis Inc.
C/o The Prentice-Hall Corporation System, Inc.
2711 Centerville Road, Suite 400
Wilmington, DE 19808

Re: Notice of Violation of California Consumer Legal Remedies Act

Aramis Inc.:

Please be advised that we represent Behrad Manouchehri, who purchased Aramis Inc. and Estee Lauder's MAX LS Age-Less Face Cream. We send this letter under the California Consumers Legal Remedies Act, California Civil Code Section 1750 et seq. ("CLRA"), to notify Aramis Inc. that its sale of Lab Series MAX LS products with illegal misrepresentations on the product packaging violates the CLRA and to demand Aramis Inc. rectify its violations within 30 days of receipt of this letter.

Aramis Inc. has sold false and deceptively labeled Lab Series products to Mr. Manouchehri and other consumers in violation of California Civil Code § 17500 and § 17200. Aramis Inc. has misrepresented to Mr. Manouchehri and consumers that MAX LS products utilize resveratrol, "sirtuin technology" and the "molecular age-less complex" to "erase the signs of aging" (among other claims) when, in fact, resveratrol, "sirtuin technology," and this "molecular age-less complex" do not provide the benefits promised. As a result, Mr. Manouchehri and other consumers have received a product that is something other than what is represented on MAX LS packaging and through Aramis Inc. and Estee Lauder's extensive marketing campaign.

Accordingly, we demand that within thirty (30) days of receiving this letter, Aramis Inc. agree to (1) refrain from engaging in the deceptive practices described above at any time in the future; and (2) return all money Aramis Inc. and Estee Lauder's customers paid for MAX LS. If Aramis Inc. refuses to provide the demanded relief within thirty (30) days, we will seek compensatory and punitive damages, statutory damages, injunctive relief, restitution, and any other appropriate equitable relief.

We hope to confer with you to resolve these violations. I look forward to hearing from you.

Very Truly Yours,

/s/ *Todd D. Carpenter*
Todd D. Carpenter

≣ CARPENTER LAW GROUP

402 West Broadway, 29th Floor | San Diego, California 92101 | P. 619.347.3517 | Web: Carpenterlawyers.com

April 28, 2014

VIA CERTIFIED MAIL RETURN RECEIPT REQUESTED

Fabrizio Freda
The Estee Lauder Companies, Inc.
767 Fifth Avenue
New York, NY 10153

Re: Notice of Violation of California Consumer Legal Remedies Act

Dear Mr. Freda:

Please be advised that we represent Behrad Manouchehri, who purchased Estee Lauder's MAX LS Age-Less Face Cream. We send this letter under the California Consumers Legal Remedies Act, California Civil Code Section 1750 et seq. ("CLRA"), to notify Estee Lauder Companies, Inc. that its sale of Lab Series MAX LS products with illegal misrepresentations on the product packaging violates the CLRA and to demand Estee Lauder rectify its violations within 30 days of receipt of this letter.

Estee Lauder has sold false and deceptively labeled Lab Series products to Mr. Manouchehri and other consumers in violation of California Civil Code § 17500 and § 17200. Estee Lauder has misrepresented to Mr. Manouchehri and consumers that MAX LS products utilize resveratrol, "sirtuin technology" and the "molecular age-less complex" to "erase the signs of aging" (among other claims) when, in fact, resveratrol, "sirtuin technology," and this "molecular age-less complex" do not provide the benefits promised.

As a result, Mr. Manouchehri and other consumers have received a product that is something other than what is represented on MAX LS packaging and through Estee Lauder's extensive marketing campaign.

Accordingly, we demand that within thirty (30) days of receiving this letter, Estee Lauder agree to (1) refrain from engaging in the deceptive practices described above at any time in the future; and (2) return all money Estee Lauder's customers paid for MAX LS. If Estee Lauder refuses to provide the demanded relief within thirty (30) days, we will seek compensatory and punitive damages, statutory damages, injunctive relief, restitution, and any other appropriate equitable relief.

PAGE 2

We hope to confer with you to resolve these violations. I look forward to hearing from you.

Very Truly Yours,

/s/ Todd D. Carpenter
Todd D. Carpenter

CARPENTER LAW GROUP
Todd D. Carpenter (CA SBN 234464)
402 West Broadway, 29th Floor
San Diego, California 92101
P. 619.756.6994
F. 619.756.6991
Todd@Carpenterlawyers.com

Additional Counsel at signature;

Attorneys for Plaintiff and the Proposed Class

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF CALIFORNIA

BEHRAD MANOUCHEHRI, on behalf of himself and all others similarly situated, Plaintiff, vs. THE ESTEE LAUDER COMPANIES INC. and ARAMIS INC., Defendants.	Case No. **'14CV1064 JM KSC** **CLASS ACTION COMPLAINT** **DECLARATION OF TODD D. CARPENTER REGARDING JURISDICTION** JURY TRIAL DEMAND

I, Todd D. Carpenter, declare as follows:

    1. I am an attorney duly licensed to practice before all of the courts of the State of California. I am the principle and owner of the Carpenter Law Group, and the counsel of record for Plaintiff in the above-entitled action

    2. Defendants The ESTEE LAUDER COMPANIES, INC. and ARAMIS, INC. have done and are doing business in the Southern District of California. Such business includes the marketing, distributing, and sale of its

1

1 Lab Series MAX LS products.

2   3.   Additionally, Plaintiff Behrad Manouchehri resides in the County of

3 San Diego and his purchase of the products as set forth in the Complaint

4 occurred in San Diego County.

5

6   I declare under penalty of perjury under the laws of the State of

7 California that the foregoing is true and correct.

8

9

10 DATED: April 28, 2014

11

12   By: *Todd D. Carpenter*

13   Todd D. Carpenter (CA SBN 234464)
                          CARPENTER LAW GROUP
14   402 West Broadway, 29th Floor
                          San Diego, California 92101
15   P. 619.756.6994
                          F. 619.756.6991
16   Todd@Carpenterlawyers.com

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CIVIL COVER SHEET

The JS 44 civil cover sheet and the information contained herein neither replace nor supplement the filing and service of pleadings or other papers as required by law, except as provided by local rules of court. This form, approved by the Judicial Conference of the United States in September 1974, is required for the use of the Clerk of Court for the purpose of initiating the civil docket sheet. *(SEE INSTRUCTIONS ON NEXT PAGE OF THIS FORM.)*

I. (a) PLAINTIFFS
Behrad Manouchehri, on behalf of himself and all others similarly situated,

DEFENDANTS
The Estee Lauder Companies Inc. and Aramis Inc.

(b) County of Residence of First Listed Plaintiff   San Diego
(EXCEPT IN U.S. PLAINTIFF CASES)

County of Residence of First Listed Defendant _____
(IN U.S. PLAINTIFF CASES ONLY)
NOTE: IN LAND CONDEMNATION CASES, USE THE LOCATION OF
THE TRACT OF LAND INVOLVED.

(c) Attorneys *(Firm Name, Address, and Telephone Number)*
Todd C. Carpenter, Esq. 234464
Carpenter Law Group, 402 West Broadway, 29th Floor
San Diego, CA 92101   Phone: 619-756-6994

Attorneys *(If Known)*

'14CV1064 JM   KSC

II. BASIS OF JURISDICTION *(Place an "X" in One Box Only)*

☐ 1 U.S. Government
       Plaintiff

☒ 3 Federal Question
       (U.S. Government Not a Party)

☐ 2 U.S. Government
       Defendant

☒ 4 Diversity
       (Indicate Citizenship of Parties in Item III)

III. CITIZENSHIP OF PRINCIPAL PARTIES *(Place an "X" in One Box for Plaintiff and One Box for Defendant)*
(For Diversity Cases Only)

	PTF	DEF		PTF	DEF
Citizen of This State	☒ 1	☐ 1	Incorporated *or* Principal Place of Business In This State	☐ 4	☐ 4
Citizen of Another State	☐ 2	☐ 2	Incorporated *and* Principal Place of Business In Another State	☐ 5	☒ 5
Citizen or Subject of a Foreign Country	☐ 3	☐ 3	Foreign Nation	☐ 6	☐ 6

IV. NATURE OF SUIT *(Place an "X" in One Box Only)*

CONTRACT	TORTS		FORFEITURE/PENALTY	BANKRUPTCY	OTHER STATUTES
☐ 110 Insurance	**PERSONAL INJURY**	**PERSONAL INJURY**	☐ 625 Drug Related Seizure of Property 21 USC 881	☐ 422 Appeal 28 USC 158	☐ 375 False Claims Act
☐ 120 Marine	☐ 310 Airplane	☐ 365 Personal Injury - Product Liability	☐ 690 Other	☐ 423 Withdrawal 28 USC 157	☐ 400 State Reapportionment
☐ 130 Miller Act	☐ 315 Airplane Product Liability	☐ 367 Health Care/ Pharmaceutical			☐ 410 Antitrust
☐ 140 Negotiable Instrument	☐ 320 Assault, Libel & Slander	Personal Injury Product Liability		**PROPERTY RIGHTS**	☐ 430 Banks and Banking
☐ 150 Recovery of Overpayment & Enforcement of Judgment	☐ 330 Federal Employers' Liability	☐ 368 Asbestos Personal Injury Product Liability		☐ 820 Copyrights	☐ 450 Commerce
☐ 151 Medicare Act	☐ 340 Marine			☐ 830 Patent	☐ 460 Deportation
☐ 152 Recovery of Defaulted Student Loans (Excludes Veterans)	☐ 345 Marine Product Liability	**PERSONAL PROPERTY**	**LABOR**	☐ 840 Trademark	☐ 470 Racketeer Influenced and Corrupt Organizations
☐ 153 Recovery of Overpayment of Veteran's Benefits	☐ 350 Motor Vehicle	☐ 370 Other Fraud	☐ 710 Fair Labor Standards Act	**SOCIAL SECURITY**	☐ 480 Consumer Credit
☐ 160 Stockholders' Suits	☐ 355 Motor Vehicle Product Liability	☐ 371 Truth in Lending	☐ 720 Labor/Management Relations	☐ 861 HIA (1395ff)	☐ 490 Cable/Sat TV
☐ 190 Other Contract	☐ 360 Other Personal Injury	☐ 380 Other Personal Property Damage	☐ 740 Railway Labor Act	☐ 862 Black Lung (923)	☐ 850 Securities/Commodities/ Exchange
☐ 195 Contract Product Liability	☐ 362 Personal Injury - Medical Malpractice	☐ 385 Property Damage Product Liability	☐ 751 Family and Medical Leave Act	☐ 863 DIWC/DIWW (405(g))	☒ 890 Other Statutory Actions
☐ 196 Franchise			☐ 790 Other Labor Litigation	☐ 864 SSID Title XVI	☐ 891 Agricultural Acts
REAL PROPERTY	**CIVIL RIGHTS**	**PRISONER PETITIONS**	☐ 791 Employee Retirement Income Security Act	☐ 865 RSI (405(g))	☐ 893 Environmental Matters
☐ 210 Land Condemnation	☐ 440 Other Civil Rights	**Habeas Corpus:**		**FEDERAL TAX SUITS**	☐ 895 Freedom of Information Act
☐ 220 Foreclosure	☐ 441 Voting	☐ 463 Alien Detainee		☐ 870 Taxes (U.S. Plaintiff or Defendant)	☐ 896 Arbitration
☐ 230 Rent Lease & Ejectment	☐ 442 Employment	☐ 510 Motions to Vacate Sentence		☐ 871 IRS—Third Party 26 USC 7609	☐ 899 Administrative Procedure Act/Review or Appeal of Agency Decision
☐ 240 Torts to Land	☐ 443 Housing/ Accommodations	☐ 530 General			☐ 950 Constitutionality of State Statutes
☐ 245 Tort Product Liability	☐ 445 Amer. w/Disabilities - Employment	☐ 535 Death Penalty	**IMMIGRATION**		
☐ 290 All Other Real Property	☐ 446 Amer. w/Disabilities - Other	**Other:**	☐ 462 Naturalization Application		
	☐ 448 Education	☐ 540 Mandamus & Other	☐ 465 Other Immigration Actions		
		☐ 550 Civil Rights			
		☐ 555 Prison Condition			
		☐ 560 Civil Detainee - Conditions of Confinement			

V. ORIGIN *(Place an "X" in One Box Only)*

☒ 1 Original Proceeding   ☐ 2 Removed from State Court   ☐ 3 Remanded from Appellate Court   ☐ 4 Reinstated or Reopened   ☐ 5 Transferred from Another District *(specify)*   ☐ 6 Multidistrict Litigation

VI. CAUSE OF ACTION
Cite the U.S. Civil Statute under which you are filing *(Do not cite jurisdictional statutes unless diversity)*:
28 U.S.C. Sec 1332(d) and 28 U.S.C. Sec 1391
Brief description of cause:
deceptive, false, and/or misleading claims and promises to consumers

VII. REQUESTED IN COMPLAINT:
☒ CHECK IF THIS IS A **CLASS ACTION** UNDER RULE 23, F.R.Cv.P.

DEMAND $
5,000,000.00

CHECK YES only if demanded in complaint:
JURY DEMAND: ☒ Yes   ☐ No

VIII. RELATED CASE(S) IF ANY
(See instructions):
JUDGE _____   DOCKET NUMBER _____

DATE
04/28/2014

SIGNATURE OF ATTORNEY OF RECORD
s/ Todd D. Carpenter

FOR OFFICE USE ONLY

RECEIPT # _____   AMOUNT _____   APPLYING IFP _____   JUDGE _____   MAG. JUDGE _____