

Commitment and Consumer Sovereignty:
Classic Evidence from the Real Thing

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Submitted to SSRN: June 2011. Note, the attached manuscript is an unpublished paper dated 1991 (was under consideration at the *Journal of Business* as of this date) which we recently located a hard copy in response to a reader's request. Address correspondence to the authors at wahoo@clmson (Daniel K. Benjamin, Clemson University) and mmitchell@cnhpartners (Mark Mitchell, CNH Partners, LLC).

Commitment and Consumer Sovereignty: Classic Evidence from the Real Thing

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* Armen Alchian, Doug Diamond, Benjamin Klein, John Lott, Carol Simon, seminar participants at the Federal Trade Commission, Securities and Exchange Commission and UCLA Law and Economics Workshop, anonymous referees and especially Mike Maloney, Lisa Meulbroek and Harold Mulherin provided helpful comments. Robert Clement participated in the early stages of this paper. The Coca-Cola Company and Henderson Advertising generously provided data.

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"Producers ... create wants through advertising and salesmanship. Wants thus come to depend upon output."¹

"Our boss is the consumer."²

I. INTRODUCTION

On Tuesday, April 23, 1985 the Coca-Cola Company announced at a heavily publicized news conference "...the most significant soft drink marketing development in the company's ... history"³ Coca-Cola would replace the soft drink that had been the company's leading brand for nearly 100 years with a formula that 200,000 taste tests suggested would be a more vigorous competitor for its chief rival, Pepsi. Coca-Cola Chairman Robert Goizueta declared "It's the surest move ever made because the consumers made it."⁴ The announcement generated a profusion of news stories and public commentary, all laced with a sense of amazement that Coca-Cola, a company steeped in tradition, would change the formula of its flagship product. Eighty-one percent of the U.S. population knew of the change in formula within forty-eight hours, more people than were aware in July 1969 that Neil Armstrong had walked on the moon.

¹ Galbraith (1958), p. 158.

² Donald Keough, president of the Coca-Cola Company, at the July 11, 1985 news conference announcing the return of the original formula for Coca-Cola ten weeks after it's discardation. See Oliver (1986), p. 181.

³ Oliver (1986), p. 123.

⁴ Oliver (1986), p. 133.

Within six weeks, ninety-six percent of Americans knew of the formula change. By all appearances, Coca-Cola's move had been a media coup with few precedents in American business history, as well as a masterful marketing decision.

Initial impressions proved misleading. Within a few weeks, Coca-Cola's regular weekly consumer surveys turned sharply negative, just as new Coke reached nationwide distribution in May. Calls to the company's toll-free WATS line, which routinely had averaged 400 per day prior to the announcement of new Coke, jumped to 1,000 per day, most of them objecting to the change in formula. By June, WATS line complaints about the change were averaging 8,000 per day and protest letters from consumers were arriving at the rate of 5,000 a week.

On July 11, 1985, the Coca-Cola Company held its second heavily publicized news conference of 1985, this time to announce what is arguably the largest marketing reversal of the century -- the return of the old formula, newly-named "Coca-Cola Classic." Within a period spanning little more than ten weeks, one of the most successful marketers of consumer products in American history had unceremoniously discarded the product responsible for the company's rise to worldwide prominence, and then, just as abruptly, welcomed back that product. At Coca-Cola's July 11 news conference, Donald Keough, president of Coca-Cola, apologized profusely for the withdrawal of the original formula. The response to the company's decision was not disappointing; within hours, Coca-Cola received 18,000 calls, nearly universal in approving the revival of the old formula.

Coca-Cola's seeming execution of the product responsible for the firm's leadership in the soft drink industry, followed by the abrupt resuscitation of its flagship product, drew strongly divergent reactions from a variety of sources. One view of the episode is that Coca-Cola had

pre-planned the entire series of events, orchestrating the introduction of new Coke and the revival of the original formula in a ploy to obtain unpaid advertising in the news media.⁵ According to this view, Coca-Cola had intended from the outset to end up with the best of both worlds: a taste-test winner to compete for the business of Pepsi drinkers, and a proven product to satisfy the demands of Coca-Cola loyalists, thereby yielding a net increase in market share. The alternative view of 1985's events is that the withdrawal of the original formula was a disastrous mistake by Coca-Cola management, and its return in the guise of Coca-Cola Classic was simply an attempt to recover from consumer rejection of the new formula. In conducting its extensive taste-testing of the new formula, Coca-Cola had not told Coke drinkers (61 percent of whom said they preferred the new formula) that the original formula would no longer be available. When the launch of new Coke made this fact clear, it is argued, there was a widespread emotional backlash among Coca-Cola loyalists who could no longer purchase the original formula.⁶

This paper analyzes the effects of the Coca-Cola Company's decision to discard and then revive its flagship product's formula. We first examine the stock market impact of the introduction of new Coke and the return of the original formula. This evidence suggests that the new Coke episode was indeed a costly mistake for the owners of the Coca-Cola Company, resulting in stock market losses of approximately \$500 million. We then investigate the source of these losses, distinguishing between the impact of the episode on Coca-Cola's market share and its price. We argue that the Coca-Cola Company had established a reputation among

⁵ Coca-Cola estimated that it would have taken at least \$100 million in advertising expenditures to generate the public attention caused by its decision to replace the original formula with new Coke. See Oliver (1986), p. 120.

⁶ Oliver (1986), p. 113.

consumers for producing a product (brand Coca-Cola) that would everywhere and always be the same product. In return, consumers had invested in consumption capital specific to the original formula. When that formula was withdrawn from the market in April of 1985, consumers suffered a loss in their consumption capital. The resulting decline in demand forced the company to reduce the price of its flagship product. We estimate that the net present value of the lost revenues due to the elimination of Coca-Cola's price premium is sufficient to account for the stock market losses suffered by the company's owners. We conclude that the lesson from the new Coke episode is a simple one: Coca-Cola failed to deliver on its promises to consumers, and they in turn promptly and effectively punished the company for the error in its ways.

II. STOCK PRICE ANALYSIS

We begin our evaluation of the new Coke episode with a stock market event analysis. Using the Center for Research in Security Prices (CRSP) daily stock returns file, we estimate the market model

$$R_{it} = \alpha_i + \beta_i R_{mt} + \epsilon_{it}$$

$$\epsilon_{it} \sim N(0, \sigma^2),$$

for Coca-Cola over the year (253 trading days) preceding the introduction of new Coke. We also estimate the market model for Pepsi, Coca-Cola's chief soft-drink competitor. The β estimates for Coca-Cola and Pepsi are 0.90 and 1.00, respectively.⁷

⁷ To account for the possible presence of non-synchronous trading, we also estimate a modified form of equation (1) for both companies, in which we include $R_{m,t-1}$ and $R_{m,t+1}$ as additional independent variables (see Brown and Warner (1985), Dimson (1979) and Scholes and Williams (1977)). The equation that supplements the contemporaneous market return with the lead and lagged market return suggest the presence of non-synchronous trading: for both Coca-Cola and Pepsi, the respective stocks' returns are related to the lagged market returns. The abnormal returns estimated based on the inclusion of lead and lagged market returns do not differ significantly from those obtained using the conventional

We then use the market model estimates $(\hat{\alpha}, \hat{\beta})$ to forecast the daily returns on Coca-Cola and Pepsi stock commencing April 23, 1985 (date of Coca-Cola's announcement of new Coke), conditional on the actual return on the CRSP equally-weighted market index, R_{mt} . Under the null hypothesis that the expected value of the error term during the event period is zero, abnormal returns are deviations of this error term from zero. Thus, the abnormal return to stock i (Coca-Cola and Pepsi, respectively) in time t is

$$AR_{it} = R_{it} - [\hat{\alpha}_i + \hat{\beta}_i R_{mt}].$$

The summation of the abnormal returns over the number of days in the event window yields a cumulative abnormal return:

$$CAR_i = \sum_{t=1}^T AR_{it}.$$

The CAR measures the cumulative impact of the introduction of new Coke on the value of Coca-Cola and Pepsi at any point during the event window.⁸

Table 1 displays the AR and CAR for each of the ten trading days beginning April 23

single factor market model.

⁸ The standard error of forecast for the AR is

$$\sigma_{ar} = \{\sigma^2(1 + 1/N_e + (R_{mt} - R_m)^2 / CSSR_m)\}^{1/2}$$

and for the CAR is

$$\sigma_{car} = \{\sigma^2[\sum_{t=1}^{N_i} (1 + 1/N_e + (R_{mt} - R_m)^2 / CSSR_m) + N_i(N_i - 1) / N_e]\}^{1/2}$$

where σ^2 is the estimated residual variance for the estimation period, N_e is the number of trading days in the estimation period, N_i is the number of trading days in the event period, R_m is the estimation period sample mean of the market return, and $CSSR_m$ is the corrected sum of squares of the market return during the event period. The first term in square brackets for the standard forecast error of the CAR sums the variances of the abnormal returns over the period for which the CAR is estimated. The second term in square brackets adjusts for the fact that the forecast errors over the course of an event are not independent even if the random error terms in the forecasting equation are independently distributed. The second term is positive, except for the first day of the event window, when it is zero.

for both Coca-Cola and Pepsi. On April 23, the day Coca-Cola announced the formula change, the value of Coca-Cola stock fell 2.56 percent relative to its forecast value. This negative announcement-day AR is statistically significant at the .01 level. During the next few trading days, Coca-Cola stock continued to decline. By May 6, the tenth trading day following the announcement, the CAR had dropped to -7.23 percent. The CAR for Coca-Cola is negative and statistically significant at least at the .10 level for every day of the ten-day event window. On April 22, 1985 the market value of outstanding Coca-Cola stock was \$9.37 billion; the equity value of Coca-Cola declined between \$375 million and \$700 million during the period commencing with the introduction of new Coke, depending on the length of the event window used to measure the valuation effects.

The results from the first ten trading days commencing with Coca-Cola's announcement do not reflect a temporary price decline. Figure 1 plots the CAR for Coca-Cola during the period beginning April 23 and ending July 31 (the last day of the month that Coca-Cola returned the original formula). The CAR plot reveals that Coca-Cola stock did not recover following the initial decline, but rather continues to decline during the month of May as new Coke reached full nationwide distribution. Over the period from May 7 (the first trading day following the ten-day new Coke event window) through July 9 (the day before Coca Cola announced the return of the old formula), the CAR for Coca-Cola averages -8.1 percent.⁹

In introducing new Coke, the Coca-Cola Company's stated intention had been to alter the flavor of its flagship product from the more acidic portion of the taste spectrum that it had relied

⁹ The CAR for Coca Cola reached its lowest level on Friday, July 5 at -12.8 percent. Interestingly, on this day, the president of Coca-Cola, Donald Keough, instructed a small group of his staff to plan for alternative methods of bringing back the original formula, even though no formal corporate decision on this issue had been made. See Enrico and Kornbluth (1986), p. 231 and Oliver (1986), p. 175.

upon for nearly one hundred years, toward the sweeter portion of the taste spectrum occupied by Pepsi.¹⁰ Whatever the impact of this move on Coca-Cola's stockholders, one would expect that it would have made the Coca-Cola product a better substitute for Pepsi, thereby reducing the demand for Pepsi and depressing the value of Pepsi. This phenomenon does not appear to have occurred, based on estimates of the AR and CAR for Pepsi shown in Table 1 for the ten trading days commencing April 23.

On the April 23 announcement date, Pepsi stock rose 3.28 percent relative to its forecast value, an increase that is statistically significant at the .01 level. The next day, however, Pepsi's AR is -1.93 percent, yielding a CAR from the second day until the end of the ten trading day event window that is not statistically different from zero, although it is consistently positive (ranging from 0.84 to 4.64 percent). Figure 1 indicates that the CAR for Pepsi remains positive during the period following new Coke's introduction through July 9 (the day before Coca-Cola announced its intentions to bring back the original formula). The CAR for Pepsi averages 6.7 percent over this period.

On July 9, 1985, Coca-Cola management decided to revive the original formula and scheduled a news conference for July 11 without revealing the exact purpose of the news conference. During the late morning of July 10, rumors spread that Coca-Cola planned to revive the original formula; management subsequently issued a press release confirming the impending revival of old Coke.¹¹ Coca-Cola went ahead with its scheduled news conference on the 11th where management announced the return of the original formula to the market, albeit under a

¹⁰ Enrico and Kornbluth (1986), pp. 210, 216, 218; Oliver (1986), pp. 109, 114-7.

¹¹ Oliver (1986), p. 177.

different name -- Coca-Cola Classic. While the company argued that new Coke would be its principal flagship product, it said that the availability of Coca-Cola Classic would satisfy those consumers who felt a strong allegiance to the original formula. To estimate ARs and CARs associated with the revival of the original formula, we continue to use the market model estimates from the one year (253 trading days) period preceding April 23. Table 2 displays Coca-Cola's ARs and CARs for the ten trading days commencing with the July 10 press release. On July 10 and 11, Coca-Cola stock increased 2.89 and 2.80 percent relative to its forecast value, respectively. Both of these positive ARs are significant at the .01 level. However, several subsequent days of negative ARs push the CAR back toward zero during the ten-day event window. The plot of Coca-Cola's CAR over the period April 23 through July 31 in Figure 1 illustrates that the value of Coca-Cola stock remains below its forecast value, even after its decision to return the original formula.¹²

Table 2 also displays the ARs and CARs for Pepsi over the ten-day period commencing July 10, the day Coca-Cola announced the revival of the original formula. On July 10, the AR for Pepsi is -1.78 percent, though not statistically significant. The following day, the AR is a statistically significant 2.33 percent, negating the previous day's decline. Throughout the remainder of the ten-day event window, Pepsi stock does not move significantly. The result is a CAR at the end of the ten day event window that, while negative, is not significantly different from zero. An examination of Figure 1, which shows the CAR forecast throughout the April 23 - July 31 period, confirms the (statistically insignificant) negative impact on Pepsi stock of the

¹² The CAR for Coca-Cola remains negative well beyond the end of July 1985. Over the next fifty trading days, Coca-Cola's CAR ranges from -6.5 to -13.3 percent.

return of the Classic. As late as July 5, the Friday before the return of the original formula, the CAR for Pepsi was as high as 8.5 percent. After the return of Coca-Cola's original formula, Pepsi's CAR dropped close to 0.

Overall, the stock market evidence suggests the introduction of new Coke resulted in a significant, sustained decline in the value of Coca-Cola stock. Although the company's return of the original formula recovered some of these losses, Coca-Cola's stock price does not return to its forecast level as shown in Figure 1. While Pepsi stock marginally increased when Coca-Cola introduced new Coke, it returned close to its forecast level after the return of the original formula. These findings are consistent with the notion that Coca-Cola erred by introducing the new formula. Instead of making Coca-Cola a more formidable opponent for Pepsi, the formula change actually reduced its advantage.

III. THE IMPACT OF NEW COKE ON MARKET SHARE AND PRICE

The stock price evidence suggests that the Coca-Cola Company made a mistake, the stock market quickly revealed the error, and the company moved swiftly to rectify matters. Why did the value of Coca-Cola stock fail to fully return to its pre-event forecast levels? A small part of the answer is that some of the errantly-incurred costs of developing the new formula were non-recoverable, once new Coke proved to be a failure.¹³ Nevertheless, we have found no evidence suggesting that such costs can account for more than a small proportion of the negative

¹³ Not all of the initial development and marketing costs were completely non-recoverable, since the company has continued to sell new Coke in this country, and apparently has introduced it successfully in other countries. Nevertheless, since development expenditures were conditioned on the company's expectation that new Coke would more than fully supplant the original formula, while in fact new Coke's U.S. sales are only one-twentieth as great as those of Coca-Cola Classic, a substantial portion of such expenditures surely must be considered non-recoverable.

abnormal returns suffered by the company's stock. There is anecdotal evidence that, because it is now marketing both new Coke and Coca-Cola Classic, Coca-Cola's distribution costs have gone up;¹⁴ but none of the sources we have found suggests that the magnitude of the increase can explain much of the decline in the value of Coca-Cola stock. Even Coca-Cola's advertising on its flagship brands (new Coke and Coca-Cola Classic) can account for little of the observed change in the price of the company's stock. In 1984, Coca-Cola spent approximately \$50 million advertising brand Coca-Cola. In 1985, advertising expenditures on new Coke and Coca-Cola Classic rose to approximately \$58 million, but 1986 advertising expenditures on new Coke and Coca-Cola Classic fell to \$50 million.¹⁵

Since there are no clearly identifiable cost increases associated with the new Coke episode that can account for the estimated stock market effects, we turn to the revenue side. If the stock market forecast is correct, then Coca-Cola should have suffered a decline in either market share or product price, or both. We examine each in turn.

A. Coca-Cola's Market Share

For at least a decade prior to the new Coke episode, brand Coca-Cola had been losing market share. Between 1976 and 1982 Coca-Cola's share of the soft drink market declined from 26.3 percent to 24.6 percent, and by 1984 brand Coca-Cola commanded only 22.5 percent of the market. Roger Enrico, president of Pepsi-Cola for much of this period, argues that his

¹⁴ *New York Times*, July 11, 1985, p. A1.

¹⁵ The company had planned to spend even more promoting new Coke in 1985, but reduced the size of its advertising campaign in an effort to limit the product's visibility after the furor over its introduction erupted. *Business Week*, June 24, 1985, p. 48, and Oliver (1986), p. 187.

company's advertising was enabling brand Pepsi to make inroads on Coca-Cola.¹⁶ Oliver (1986) lends credence to this view in noting that Coca-Cola officials also believed that at least part of their brand's losses represented gains for Pepsi. On a separate front, Coca-Cola's market share was also under assault from a plethora of new soft drink brands during this period: there were 10 new *cola* drinks alone introduced between 1979 and 1983. The third factor to which Coca-Cola's loss in market share has been attributed is the company's own success with the introduction of Diet Coke. When the Coca-Cola Company first marketed Diet Coke in 1982, the beverage became an instant success. Within a year, Diet Coke's market share exceeded the market share of any other diet drink, and within two years, Diet Coke became the number three soft drink in the country, trailing only the flagship brands, Coca-Cola and Pepsi-Cola.

If we are to understand the impact of new Coke on brand Coca-Cola, we must reckon with the effects of these other forces. To account for the popularity of Diet Coke and its purported ability to lure Coca-Cola consumers away from the flagship brand, we use a variable called DIETCOKE: it is simply the market share of brand Diet Coke. As discussed more fully in footnote 17, below, we have experimented with a variety of measures to try to account for the other competitive forces contributing to brand Coca-Cola's declining market share during the late 1970s and early 1980s; none has proven satisfactory. As a purely statistical matter, then, we include a time trend (TIME) in the regressions reported below, as a proxy for these other forces. Finally, the dummy variable, NEWCOKE, takes a value of 1 for the year 1985 and a value of 0 for all other years in the sample. This variable measures the short-run impact of new

¹⁶ See Enrico and Kornbluth (1986) for repeated arguments by Enrico regarding the effectiveness of Pepsi advertising.

Coke on brand Coca-Cola's market share.

The dependent variable in the regression is brand Coca-Cola's market share (including *both* new Coke and Coca-Cola Classic during 1985-89). Using annual data on sales for the period 1976-89, we estimate a regression equation with brand Coca-Cola's market share (COKE) as a function of a time trend (TIME), a dummy variable (NEWCOKE) for new Coke, and the market share of Diet Coke (DIETCOKE). The coefficient estimates for this equation are shown below, with t-statistics in parentheses.¹⁷

$$\text{COKE} = 26.6 - 0.27 \text{ TIME} - 0.25 \text{ DIETCOKE} - 1.07 \text{ NEWCOKE}$$

$$\qquad\qquad (-5.81) \qquad (-4.68) \qquad\qquad (-4.00)$$

$$\text{Obs.} = 14 \qquad R^2 = 0.99 \qquad \text{D.W.} = 1.41$$

The coefficient estimate (significant at the .01 level) for TIME indicates that during the sample period, brand Coca-Cola lost roughly a quarter of a percentage point every year to competitive forces that we have been unable to clearly isolate. The competitive impact of Diet Coke on Coca-Cola is illustrated. The estimated coefficient of -0.25, statistically significant at the .01 level, implies that every case of Diet Coke sold reduced the sale of brand Coca-Cola by a six-pack. The main variable of interest, NEWCOKE, reveals a decline in brand Coca-Cola market share of just over one percentage point in 1985--roughly 5% of sales, or 70 million cases of brand Coca-Cola. This decline occurred despite the fact that the original formula was off the market for only two months in 1985, and despite the fact that we include sales of new Coke in

¹⁷ To attempt to isolate the identity of the other forces eroding Coca-Cola's market share, we have used (i) the market share(s) of Pepsi, other colas, and other Coca-Cola products, (ii) the number of competing colas and soft drink brands, and (iii) various advertising measures. None of these have eliminated the statistical effect of TIME, and none have any estimated impact on Coca-Cola's market share when TIME is included in the regression.

the Coca-Cola market share measure.

We modify the regression equation by adding a dummy variable, RECOVER, to determine the persistence of new Coke's negative impact on brand Coca-Cola's market share. RECOVER takes on a value of 1 for the year 1986 and a value of 0 for all other years. Since we leave the variable NEWCOKE in the regression, the estimated coefficient of RECOVER should be interpreted as follows: a value equal to that of NEWCOKE's coefficient would imply that the 1985 loss of market share fully persisted into 1986; a value of zero would imply that *all* of the 1985 share loss had been recouped by 1986; and finally, a positive value would imply that 1985's share loss had been more than offset, perhaps because the addition of new Coke to the product line enabled the Coca-Cola Company to attract business away from former Pepsi drinkers. The results are below, with t-statistics in parentheses.

$$\begin{array}{r}
 \text{COKE} = 26.6 - 0.28 \text{ TIME} - 0.24 \text{ DIETCOKE} \\
 \qquad \qquad \qquad (-5.68) \qquad \qquad (-4.22) \\
 \\
 \qquad \qquad -1.11 \text{ NEWCOKE} - 0.19 \text{ RECOVER} \\
 \qquad \qquad (-3.94) \qquad \qquad (-0.67) \\
 \\
 \text{Obs.} = 14 \qquad R^2 = 0.99 \qquad \text{D.W.} = 1.38
 \end{array}$$

Inclusion of the 1986 dummy variable (RECOVER) does not significantly alter the coefficient estimates or significance levels of the other variables. Although the point estimate of the coefficient of RECOVER is negative, it is not significantly different from zero, suggesting that by 1986, no appreciable impact of the new Coke episode was apparent in brand Coca-Cola's market share. Conversely, since the estimated coefficient of RECOVER is not positive, the data imply that the addition of new Coke to the product line did not enhance the company's sales.

Overall, the market share regressions suggest that the introduction of new Coke temporarily depressed brand Coca-Cola's market share, but that recovery occurred quickly. Equivalently, although Coca-Cola surely lost some profits in 1985 due to lost sales from mid-April until mid-July, it seems highly implausible that these losses could account for more than a minor part of the stock market losses. Moreover, our estimates imply that, once new Coke was returned to the market, the company's market share rather quickly returned to pre-event levels, and thus cannot account for the stock market losses suffered by its owners. The source of Coca-Cola's stock market losses appear to lie elsewhere.

B. The Price of Coca-Cola

Carbonated soft drinks have three components: concentrate (the "secret formula" in the case of Coca-Cola), sweetener (caloric, such as sucrose or fructose, or non-caloric, such as aspartame), and carbonated water. When concentrate and sweetener are combined, the resulting blend is known as syrup.¹⁸ Fundamentally, soft drink makers own three separate elements of their soft drinks: the concentrate formula, the right to decide the nature and amount of the sweetener to be added, and the right to decide the proportions in which concentrate, sweetener, and carbonated water shall be combined.

Soft drink makers such as Coca-Cola manufacture their concentrate exclusively in-house. Large bottlers buy concentrate from the soft drink maker and add sweetener and carbonated water in accordance with the maker's specifications. Smaller bottlers and soda fountain distributors purchase syrup (concentrate plus sweetener) from the maker and add carbonated

¹⁸ Diet soft drinks are sold only in the form of pre-combined concentrate and (artificial) sweetener; for the resulting blend, the terms "concentrate" and "syrup" typically are used interchangeably.

water according to maker specification. Concentrate, sweetener and carbonated water are generally combined in fixed proportions for a given brand, although these proportions vary across brands.

We have obtained concentrate prices for Coca-Cola and for Pepsi on a quarterly basis from the first quarter of 1980 through the third quarter of 1989.¹⁹ Of these thirty-nine observations, twenty-one are prior to the introduction of new Coke and eighteen are subsequent to its introduction. During the sample period, Coca-Cola concentrate sold at an average price of 56.2 cents per 288-ounce case, while Pepsi concentrate sold at an average price of 54.4 cents per 288-ounce case.²⁰ Coca-Cola's average price premium of two cents per case varied frequently from quarter to quarter, since the companies rarely changed prices at the same time; in addition, the premium shrank markedly over the sample. At the beginning of the sample, Coca-Cola enjoyed a price premium of over eight cents per case, but by the second quarter of 1985, Coca-Cola concentrate was selling at a *discount* relative to Pepsi.

As it turns out, virtually all of the erosion (and ultimate reversal) of Coca-Cola's price premium over this period takes place in the course of two narrow time periods, one in 1983 and the other in 1985. Thus, we estimate the difference (in 1982 dollars) between the price of Coca-Cola concentrate and the price of Pepsi concentrate, measured in cents per 288-ounce case (PREMIUM), as a function simply of two dummy variables. These variables, which are linked

¹⁹ Concentrate prices are also available sporadically for other soft drinks. We have focused on Coca-Cola and Pepsi because (i) we were able to obtain a continuous time series for them, and (ii) as the two largest soft drink makers, they were the principal combatants in the Cola Wars of the '80s. The source of the price data is *Beverage Digest*, an industry newsletter published 22 times a year.

²⁰ Although concentrate is actually sold and priced by the gallon, it is commonplace in the industry to compare concentrate prices on the basis of cost per 288-ounce case of final product yielded by the concentrate, since yield varies across different brands. A 288-ounce case consists of 24 twelve ounce containers of soft drink.

to clearly defined episodes, account for roughly 90% of the total variation in PREMIUM over the sample period.

Prior to 1980, sugar (sucrose) was the sole sweetener used in caloric soft drinks. Beginning in 1980, Coca-Cola (but not Pepsi) began using high fructose corn syrup (HFCS) as a partial (about fifty percent) replacement for sugar as a sweetener, and permitted the bottlers who purchased concentrate to do likewise. Since fructose is considerably less expensive than sugar, Coca-Cola's early use of HFCS enabled the company (or its bottlers) to produce syrup at lower cost than was the case for Pepsi and its bottlers. This raised the derived demand for Coca-Cola's concentrate, which would be expected to enhance the concentrate price premium enjoyed by the Coca-Cola Company. Pepsi did not begin using fructose at the same time because it judged that the fructose formula made its product too sweet. By 1983, Pepsi had solved the fructose taste problem and began permitting its use in brand Pepsi. During the summer of 1983, Pepsi bottlers made the transition to HFCS, and beginning in the fourth quarter, the company repriced its concentrate accordingly, raising the price of Pepsi concentrate relative to Coca-Cola's price.²¹ To control for the impact of Pepsi's adoption of HFCS in 1983, we utilize a dummy variable called FRUCTOSE, which has a value of 0 from the beginning of the sample through the third quarter of 1983, and a value of 1 from the fourth quarter of 1983 through the end of the sample.

To investigate the impact of the new Coke episode, we utilize a dummy variable, again called NEWCOKE, although because we are now working with quarterly data, its definition differs from that in the market share regressions. In the pricing regressions below, NEWCOKE

²¹ See Enrico and Kornbluth (1986) pp. 68-72 for a detailed discussion of the fructose events of 1980-83.

has a value of 0 from the beginning of the sample through the first quarter of 1985, and a value of 1 from the second quarter of 1985 (the point at which new Coke was introduced) through the end of the sample. If the introduction of new Coke altered the price of Coca-Cola concentrate relative to Pepsi concentrate, the impact should be reflected in the estimated coefficient of NEWCOKE.²²

The regression results, using quarterly data from the first quarter of 1980 through the third quarter of 1989, are shown below with t-statistics in parentheses.

$$\text{PREMIUM} = 7.30 - 4.92 \text{ FRUCTOSE} - 4.81 \text{ NEWCOKE}$$

(-6.77) (-6.78)

Obs. = 39 R² = .90

The estimated negative coefficient of the dummy variable FRUCTOSE is statistically significant at the .01 level. The magnitude of the estimate implies that Pepsi's adoption of fructose in 1983 enabled the company to reduce the concentrate price premium held by Coca-Cola by about 4.9 cents per 288-ounce case.

The estimated negative coefficient of the dummy variable NEWCOKE is also statistically significant at the .01 level. This estimate indicates that, associated with the introduction of new Coke, and despite the re-introduction of Coca-Cola Classic, the premium on Coca-Cola concentrate fell by about 9 percent (4.8 cents per 288-ounce case) relative to Pepsi concentrate. Although a premium decline of a nickel per case sounds trivial for a product that typically retails for about twelve dollars per case, the volume of product involved is sufficient to transform a

²² Although Coca-Cola purportedly intended to price the concentrate for new Coke at 3-3.5 cents (about 5%) *above* the price it had been charging for Coca-Cola concentrate, it did not do so, and when both concentrates were subsequently being sold, both were sold at the *same* price.

nickel per case into millions of dollars per year. Coca-Cola sold an average of 1.5 billion cases of its flagship brands--new Coke and Coca-Cola Classic--in 1985 and 1986 in the U.S.; a price reduction of 4.8 cents per case implies a revenue loss of more than \$70 million *per year* in 1982 dollars, roughly \$80 million per year in 1985 dollars.²³ Thus, the negative impact of the new Coke episode on the Coca-Cola Company was not only statistically significant but also, we would argue, economically significant. We turn now to interpretations of these results.

IV. INTERPRETATION OF THE RESULTS

The empirical results in Sections II and III suggest that the new Coke episode was a costly mistake for the Coca-Cola Company. What is not obvious is *why* Coca-Cola stockholders suffered a wealth loss which (i) exceeded out of pocket costs and (ii) was only partially ameliorated by the return of the original formula. This section relates our findings to prior empirical research and suggests an explanation for the wealth losses suffered by Coca-Cola shareholders.

Prior empirical evidence shows that when firms make mistakes the value of their stock often declines by an amount that exceeds out-of-pocket costs.²⁴ Jarrell and Peltzman (1985) find

²³ We tried several modifications of the regression presented here. Addition of a time trend variable, for example, does not alter the results, and the estimated coefficient of the trend is not significantly different from zero. Shortening the period over which NEWCOKE has a value of 1 does not significantly alter the results. Omitting the dummy variable FRUCTOSE results in a statistically significant coefficient for the time trend variable, but does not significantly impact NEWCOKE. We also tried several specifications adding explanatory variables based on advertising data. None of the advertising variables were statistically significant. More importantly, the introduction of these variables did not significantly impact the NEWCOKE dummy variable. Finally, we included the price of sugar in the regression; its estimated coefficient was not significantly different from zero and its inclusion did not significantly impact the estimated values of the other coefficients.

²⁴ See Becker and Stigler (1974), Benjamin (1978), Diamond (1989), Klein, Crawford and Alchian (1978), Klein and Leffler (1981), Kreps and Wilson (1982), Lott (1988), Milgrom and Roberts (1982), Shapiro (1983) and Telser (1980) for theoretical discussions of reputations and other contract enforcement mechanisms on which the empirical

that the owners of automobile and drug producers suffer stock market losses upon the announcement of product recalls. Chalk (1986) documents stock market losses of \$200 million to the owners of McDonnell-Douglas following the May 1979 American Airlines DC-10 crash in Chicago. He observes that these losses exceeded regulatory and liability costs. Mitchell (1989) provides evidence that the market value of a firm can decline substantially even when the firm is not directly at fault for an unexpected reduction in product quality. He examines the 1982 Johnson & Johnson Tylenol capsule poisonings and finds that Johnson & Johnson suffered permanent stock-market losses of over \$1 billion, after controlling for the out-of-pocket costs and losses suffered by other over-the-counter drug producers. Mitchell and Maloney (1989) examine 63 airline crashes between 1964 and 1987 and find that for crashes that were an airline's fault, the airline's stock experienced significantly negative returns, but that in the case of other crashes, no stock market reaction ensued.

The stock market analysis of the new Coke episode implies that Coca-Cola, like those firms discussed in these other studies, suffered losses extending beyond out-of-pocket costs. The other studies, however, examine "unplanned" events; Johnson & Johnson did not hire someone to implant cyanide in Tylenol capsules, and most people board commercial airliners intending to depart them under their own power. But Coca-Cola intended the formula change to increase quality, or at least adapt to the perceived changing tastes of soft drink consumers. Why then did the owners of Coca-Cola experience losses that exceeded out-of-pocket costs?

A. Consistency

Our explanation for the losses suffered by the owners of the Coca-Cola Company is that the 1985 formula change revealed a reduction in the company's *commitment to consistency*: the product that had brought the Coca-Cola Company to international prominence had been discarded summarily, and without warning. For 100 years, the Coca-Cola Company had been sufficiently committed to the Real Thing that, no matter where the product was consumed, and no matter what the nature of the delivery system, brand Coca-Cola was the same product. There were three elements to this commitment: (i) the underlying formula for the concentrate, "Merchandise 7X," which had remained unchanged from the company's inception in 1886;²⁵ (ii) a bottling and distribution system which ensured that the taste was the same wherever and however the product was consumed;²⁶ and (iii) a quality control program that was legendary in the industry.²⁷ Through the combination of these factors, the fundamental element of "quality" guaranteed by the Coca-Cola Company was that its flagship product would everywhere and always be the *same* -- the "sublimated essence of all that America stands for."²⁸

It might seem strange that consumers would be concerned about the consistency of Coca-Cola over time or across locations. Barring an incident such as befell Johnson & Johnson with

²⁵ As Coca-Cola's long-time chairman and patriarch Robert Woodruff, put it, "they would only change the formula over my dead body." Palazzini (1986), p. 59. Woodruff died just one month prior to the introduction of new Coke. See also, *Wall Street Journal*, September 20, 1965, p. 1; Enrico and Kornbluth (1986), *op cit.*, p. 5; Oliver (1986), *op cit.*, p. 19; and *Wall Street Journal*, March 24, 1985, p. 2.

²⁶ See, for example, *1925 Annual Report*, p. 4; *Wall Street Journal*, September 20, 1965, p. 1; Oliver (1986), *op cit.*, pp. 18, 20; and Palazzini (1989), *op cit.*, p. 74.

²⁷ See, for example, *1924 Coca-Cola Annual Report*, p. 16; *1957 Coca-Cola Annual Report*, p. 13; *Wall Street Journal*, September 20, 1965, p. 1; and Watters (1978), *op cit.*, p. 57.

²⁸ Quote from William Allen White, the immortal Kansas newspaper editor, when photographed at his seventieth birthday with his favorite product. See Enrico and Kornbluth (1986), p. 5.

the cyanide contamination of Tylenol, it would seem cheap to determine whether today's Coca-Cola is the same as yesterday's, and whether the Atlanta version is the same as that sold in Afghanistan. But even though "quality" (the nature of the product) is easily discernible here, Coca-Cola could still impose substantial losses on Coke drinkers. As Becker and Stigler (1977) have theorized, consumers invest in the consumption of particular goods, so that past consumption of a good may increase the demand for current and future consumption of that same good, via an increase in consumption capital.²⁹ There is considerable anecdotal evidence that consumers in fact invest in consumption behavior (i.e., they devote resources to acquiring an addiction for certain products) and the vociferous negative response to the withdrawal of the original formula for Coca-Cola suggests that this was the case for consumers of Coca-Cola.³⁰ If this is correct, the change in the formula imposed a capital loss on committed Coca-Cola drinkers. Moreover, these individuals (and those contemplating the requisite investment in commitment) must have wondered whether Coca-Cola would make a future move that would reduce the value of their investment.³¹

Under this view, the implicit promise made by the Coca-Cola Company to its customers was that the company's flagship product would always be the same, and was therefore worthy of investment in consumption capital by its customers. How did the company make this promise credible? The work of Klein, Crawford and Alchian (1978) and Klein and Leffler (1981)

²⁹ See also Becker and Murphy (1988) and Becker, Grossman and Murphy (1990).

³⁰ See, for example, Oliver (1986) pp. 7-12, 144-8, 151, 154-8, 170, 180-1 and Enrico and Kornbluth (1986) pp. 5, 210, 219, 225-41.

³¹ This suggestion is not wholly speculative. Three months after the re-introduction of Coca-Cola Classic, nearly one-half of all consumers of Coca-Cola Classic doubted that what they were drinking was in fact the original formula. See *Advertising Age*, October 7, 1985, p. 3.

suggests an answer: brand specific investment by the *firm* (in this case, Coca-Cola) which assures consumers that the firm will in fact deliver what it promises. In effect, the firm posts the brand specific capital as a bond or collateral for its promises. In return, if the firm delivers on its promises it earns a price premium on its product just sufficient to produce a competitive rate of return on its brand name capital. Consumers demand the collateral because the circumstances of consumption imply that if the company's promise is not fulfilled, consumers will incur substantial costs. In the case of the Tylenol poisonings noted above, these costs came in the form of death. In the case of the new Coke episode, these costs came in the form of a loss of consumption capital in brand Coca-Cola, built up over years of consuming the same product.³²

Although Klein and Leffler do not demonstrate that a firm which reneges (errantly or otherwise) on its promises will in fact *lose* its price premium, the assurance aspect of the firm's brand name capital would not be *credible* unless consumers in fact punished firms which renege. The simplest way for this to take place in the event of a renege is for consumers to refuse to continue paying the price premium until and unless the firm re-invests in brand name capital.

Under this interpretation of the new Coke episode, the nickel per case decline in Coca-Cola's premium is a direct manifestation of this force at work. Measured in terms of 1985 dollars, the within-sample net present value of the lost receipts due to the decline in price premium is approximately \$300 million--which is just below the lower bound on our estimate of the stock market loss suffered by the owners of the Coca-Cola Company. Equivalently, the

³² This argument implies that the greatest reduction in the demand for Coca-Cola should have come among consumers who had been drinking the product for the longest period of time. Although we have found no systematic evidence on this matter, all of the anecdotal evidence implies that the most vociferous negative response to the change in formula came among individuals who were long-time consumers of Coca-Cola.

within-sample losses directly attributable to the loss of price premium account for about 60% of our mid-point estimates of the stock-market losses.

This does, of course, leave 40% of the stock market losses unaccounted for, but only if one ignores the persistence of the price premium effects, and the likelihood that they will continue over time, beyond the sample period. Consider, for example, the following regression, identical to our price premium regression except that it adds an interaction term, which equals the NEWCOKE dummy variable multiplied by a quarterly TIME trend. This interaction terms allows for the possibility of recovery over time in Coca-Cola's price premium.

$$\begin{aligned} \text{PREMIUM} = & 7.30 - 4.92 \text{ FRUCTOSE} - 5.44 \text{ NEWCOKE} \\ & \quad \quad \quad (-6.79) \quad \quad \quad (-5.95) \\ & + 0.074 \text{ NEWCOKE*TIME} \\ & \quad \quad \quad (1.09) \\ \text{Obs.} = & 39 \quad \quad R^2 = 0.91 \end{aligned}$$

Although the interaction term is not statistically different from zero, it is a point estimate, and for the moment we wish to emphasize that attribute. At face value, these results suggest a slightly larger initial negative impact of the new Coke episode (-5.4 cents, versus -4.8 cents), and a modest tendency for the price of Coca-Cola concentrate to revive over time: On an annual basis, the recovery rate is about 0.3 cents per case per year.

Clearly, we do not wish to place too much emphasis on this rather tenuous point estimate of the revival of Coca-Cola's concentrate price. Nevertheless, the estimate is interesting for several reasons. First, the fact that the interaction term is *not* large relative to the dummy variable implies that the loss in premium was *not* a short-lived phenomenon: more than four

years after the new Coke episode, and despite the revival of the original formula, the Coca-Cola Company was still paying \$70 million per year for its mistake.

Second, the evident persistence of the loss in price premium suggests that the within-sample estimate of the capital losses (\$300 million) implied by the price premium loss is an *underestimate*. At a recovery rate of 0.3 cents per year, the initial loss of 5.4 cents would take 18 years to be eliminated. The discounted present value of the lost receipts over this time period is about \$500 million--which is the mid-point of our stock market estimate of the losses suffered by the owners of the Coca-Cola Company. This suggests that the loss in price premium can account for the stock market losses suffered by the owners of the Coca-Cola Company.

The final point is the most speculative. What could Coca-Cola do to recover its price premium, and why would it seemingly take so long--nearly twenty years, according to the estimates above--to accomplish it? We argued earlier that Coca-Cola's reputation was one of delivering the same product, year after year, regardless of the circumstances. For the first 100 years of the company's existence, Coca-Cola had been the Real Thing through war and peace, despite wild gyrations in the price of sugar, and whatever the country in which the beverage was produced or consumed.³³ The true nature of the investment in consistency undertaken by Coca-Cola had been the continued delivery of the *same* product *despite* the cost-savings (or revenue enhancements) that it surely could have realized by changing the product to fit changing circumstances. These foregone profits became the sunk costs that assured consumers of future delivery of the Real Thing. The new Coke episode destroyed (a portion of) this investment, a

³³ "And you should know, Coca-Cola is sold in 155 nations across the world and it is the same drink everywhere." Becker (the leading man, played by Eric Roberts) in the movie "The Coca-Cola Kid," produced by Grand Bay Films International Pty Limited and Cinema Enterprises Pty Limited, 1985.

fact reflected in the loss of price premium.

If Coca-Cola is to regain the confidence of consumers--and thus its price premium--it will have to invest anew. This in turn means delivering the same product year after year, despite changes in circumstances. And since it is only *continued* delivery that will accomplish this, the process will take a long time. Exactly how long it will take obviously depends on the circumstances faced by the company. The last half of the 1980's were ones of great economic and political stability; there were no sugar price gyrations nor wars with which to contend. Thus, the extent of the delivery-investment by the company was modest, and so too was the recovery in the price premium. If the future makes consistency more costly to deliver, and if the Coca-Cola Company persists in delivering it, then the investment will be greater, and so too will be the rate of recovery in the price of its product.

B. Management

An alternative, competing explanation for the decline in Coca-Cola's stock price is that the new Coke episode signalled new information about Coca-Cola management. The introduction of new Coke was the first major decision by management following the death of Robert Woodruff, longtime chairman of Coca-Cola, and the man generally credited with Coca-Cola's rise to world-wide prominence. Woodruff, who became president of Coca-Cola in 1923, retained *de facto* control until his death in March 1985, just one month prior to the introduction of new Coke. The decline in the market value of Coca-Cola stock thus simply may have been due to the market's negative re-assessment of the new Coca-Cola management team, reflecting a

judgement that there would be other expensive mistakes in the future.³⁴

If the new Coke episode were simply a case of the market providing a negative evaluation of Coca-Cola management, then the expected net cash flows from all of Coca-Cola's current and future projects would be lower, not just that of brand Coca-Cola. Although we obviously cannot rule out all current and future projects as sources of reduced profits, we *can* focus on one very specific and comparable project as a vehicle for testing the management hypothesis.

Just as the Coca-Cola and Pepsi-Cola companies competed head-to-head with their flagship caloric brands, they directly competed with their reduced-calorie brands, Diet Coke and Diet Pepsi. We have data on concentrate prices for these two products beginning with the first quarter of 1984 and continuing through the end of our sample. Just as we calculated the real price differential (PREMIUM) for the flagship brands, we are able to calculate the real price difference between Diet Coke and Diet Pepsi in exactly the same manner. We call this variable DIET. If the decline in the brand Coca-Cola price premium was simply a proxy for poor post-Woodruff management, the negative impact on brand Coca-Cola's price premium should show up in the price premiums of the *other* products produced by the company. We thus use the Diet Coke premium (DIET) as a proxy for the managerial quality of the Coca-Cola team.³⁵

Estimating the brand Coca-Cola premium (PREMIUM) as a function of the NEWCOKE dummy variable and the brand Diet Coke premium (DIET) yields the following results, with t-statistics

³⁴ At the time of the new Coke episode, four of the top five managers at Coca-Cola were foreign-born. Enrico and Kornbluth (1986) argue pointedly that the Coca-Cola management team simply didn't understand the American people.

³⁵ Alternatively, this variable can be thought of a control variable for other forces that might have affected the demand for Coca-Cola products but not Pepsi-Cola products.

in parentheses.³⁶

$$\text{PREMIUM} = 3.02 - 5.37 \text{ NEWCOKE} + 0.13 \text{ DIET}$$

$$\qquad\qquad\qquad (-9.29) \qquad\qquad\qquad (1.50)$$

$$\text{Obs.} = 23 \qquad R^2 = 0.84$$

Under the managerial hypothesis, in which the new Coke episode was simply a signal for poor post-Woodruff management, what happened to the brand Coca-Cola price premium should also have happened to the brand Diet Coke premium. Equivalently, the Diet Coke price premium should capture the generalized negative impact of the new Coke episode on the Coca-Cola *Company's* brand name. In fact, under the strong form of the managerial hypothesis (i.e., no flagship-specific effects), the coefficient of DIET should be equal to 1 and the coefficient of NEWCOKE should be zero.³⁷ There is no evidence of this, and indeed, the test of the restriction $b_1 = 0$, $b_2 = 1$ rejects the hypothesis ($F(2,20) = 208.3$). Moreover, the estimated coefficient of NEWCOKE is not significantly different from our original estimate of -4.81; indeed, we cannot reject the restriction that $b_1 = -4.81$ and $b_2 = 0$ ($F(2,20) = 1.14$). This evidence suggests that the effects of the new Coke episode were specific to brand Coca-Cola.³⁸ Whatever the market's general assessment of post-Woodruff management may have been, its

³⁶ The variable FRUCTOSE is omitted from the regression because by 1984, the beginning of our Diet Coke sample, Pepsi had already made the transition to HFCS, and thus the value of FRUCTOSE equals one throughout the 1984-89 period.

³⁷ Of course, if the managerial hypothesis is correct and if the new Coke episode also was the *only* factor influencing PREMIUM and DIET, it might be impossible to distinguish between NEWCOKE and DIET. It is evident from the regression results that this is not, in fact, a problem.

³⁸ An alternative way to perform this test is to estimate separate regressions for the brand Coca-Cola price premium and the brand Diet Coke premium, including NEWCOKE variable in each. Doing so for the restricted sample (1984-89) reveals that the estimated coefficient of NEWCOKE is both negative and significant in the Coca-Cola regression, but not in the Diet Coke regression.

observable effects are small relative to the negative brand-specific impact of new Coke.

V. CONCLUSIONS; or, DON'T MESS WITH FRITOS³⁹

It appears that the stock market correctly anticipated consumer response to new Coke. The Coca-Cola Company forgot its heritage: "Coke is the sublimated essence of all that America stands for."⁴⁰ But the consumer remembered, and made the company pay for its amnesia. "King Consumer" soundly rejected the company's efforts to "improve" its product and, after a painful and expensive lesson in consumer economics, management reversed its decision.

The consumer response to new Coke is all the more remarkable in light of the care with which the company had approached its introduction. Coca-Cola had undertaken exhaustive taste-testing before launching new Coke, subjecting over 200,000 Coca-Cola drinkers to the new formula. More than 60% of these individuals reported that they preferred new Coke over the original formula. Why was the consumer response to new Coke so overwhelmingly negative? Oliver (1986) argues that it is because Coca-Cola did not reveal to taste-test subjects that the original formula would be withdrawn from the market. Under this view, if Coca-Cola had simply added new Coke to its product line (as it did, for example, with Diet Coke, caffeine-free Coca-Cola, and other products) those consumers who preferred the new formula would have

³⁹ The title of this section is inspired by an incident recounted in Enrico and Kornbluth (1986), p. 9. In the course of his rise to the chairmanship of Pepsi, Enrico was assigned to Frito-Lay, a subsidiary of Pepsi. While there, he was told of an episode that had happened a few years before. Sales of Fritos corn chips had suddenly and inexplicably markedly declined. The company responded by increasing its advertising and undertaking analyses of every aspect of the product. Quite by accident, a senior manager discovered that the onset of the sales decline coincided with a decision by the production staff to "improve" Fritos by altering the product's recipe. Once this alteration was promptly reversed, sales of Fritos returned to previous levels. As expressed by Enrico the lesson he learned was simple: "Don't mess with Fritos."

⁴⁰ See footnote 28, *supra*.

chosen new Coke, while those who preferred the original formula quietly would have continued consuming it. The problem with this explanation is that it fails to reconcile the fact that although sixty percent of the *people* in the taste tests preferred the new formula, more than 90% of the *sales* are going to the original formula, even though both formulas are on the market. It is possible that tens of thousands of taste-testees simply lied; we submit that there is a simpler and far more appealing explanation.

There is anecdotal evidence that the consumption of Coca-Cola is neither uniform across the population nor even uniform across those people who consume Coca-Cola: that is, a small percentage of the people who drink Coca-Cola consume a large proportion of the amount of the beverage, so that the distribution of consumption across consumers resembles the log-normal.⁴¹ This is the same pattern of consumption behavior observed among psychoactives such as alcohol, cocaine, nicotine, and caffeine, to which people are known to become addicted, and one of the active ingredients in Coca-Cola is indeed caffeine.⁴² Moreover, both the intensity and unusual character of the response of long-time Coca-Cola drinkers when the original formula was withdrawn qualitatively parallels the behavior of addicts when deprived of their drug of choice, whether that drug of choice is alcohol, nicotine, caffeine, heroin, or any of a host of others.⁴³ When Coca-Cola conducted its taste-tests, it apparently did not weight the responses of tasters by their actual consumption patterns: it simply asked them whether or not they were consumers

⁴¹ In a private communication, Thomas Oliver, author of Oliver (1986) estimates that about 20% of all people who consume Coca-Cola consume about 90% of the total amount consumed.

⁴² See, for example, Brecher (1972), Gerstein (1981), Siegel (1989), and Benjamin and Miller (1991).

⁴³ The purely physical effects naturally differ substantially across these psychoactives. Apparently, however, the addict's mental obsession with his drug of choice is remarkably similar across different psychoactives. See Siegel (1989) and Benjamin and Miller (1991).

of Coca-Cola. Presumably, intensive consumers of Coca-Cola would be less likely to say that they preferred the new formula. Given a log-normal consumption pattern among Coca-Cola consumers, the 60% of the *people* who responded positively in the taste tests could well account for less than 10% of the *consumption* of Coca-Cola.⁴⁴

Our view of this aspect of the new Coke episode goes beyond a reconciliation of the seeming contradiction between what people said to Coca-Cola and what they did to Coca-Cola. The log-normal consumption pattern for psychoactives, with a small number of addicts and abusers accounting for an extremely large proportion of consumption, helps explain why the makers of psychoactive-based products (such as tobacco and alcohol) so often innovate by introducing "product extensions" rather than "improving" the formulae of their existing products. In the view of Becker and Murphy (1988), the essence of addiction is consumption capital; thus formula changes in products to which consumers are addicted impose the greatest costs on the consumers who account for the bulk of sales.

In a slightly different view, there is another, equally important point. The growing literature on brand names and reputations argues persuasively that commitments are essential ingredients in all economic transactions. When a commitment is made and successful delivery takes place, the rewards are handsome. But when delivery does not take place, the penalties are equally harsh. Specific capital associated with new project development and marketing, together with the loss of hoped-for positive net cash flows from the project are the most obvious of these losses. Yet the penalties can extend far beyond the forfeiture of what the agent hoped to gain from the specific commitment not fulfilled. This paper's examination of new Coke provides

⁴⁴ We thank Lisa Meulbroek for making this point.

evidence of just how important those commitments are. In the case of new Coke, it also demonstrates the operation of a simple, self-enforcing mechanism for punishing firms that do not uphold their commitments -- a reduction in the price consumers will pay for their product.

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Table 1

Abnormal Returns (AR) and Cumulative Abnormal Returns (CAR) for Coca-Cola and Pepsi
Commencing with the Introduction of New Coke

Date	Coca-Cola			Pepsi				
	AR	T-stat	CAR	T-stat	AR	T-stat	CAR	T-stat
April 23	-2.56	-2.85			3.28	2.67		
April 24	-1.51	-1.68	-4.06	-3.20	-1.93	-1.57	1.35	0.78
April 25	-1.73	-1.92	-5.79	-3.71	-0.51	-0.42	0.84	0.39
April 26	1.19	1.33	-4.60	-2.55	1.30	1.06	2.14	0.87
April 29	-0.22	-0.24	-4.81	-2.38	1.53	1.24	3.67	1.32
April 30	0.81	0.90	-4.00	-1.80	0.98	0.79	4.64	1.53
May 1	-1.71	-1.90	-5.70	-2.38	-1.26	-1.02	3.39	1.03
May 2	-0.71	-0.79	-6.41	-2.49	-0.41	-0.33	2.98	0.85
May 3	-0.98	-1.09	-7.39	-2.70	0.27	0.22	3.25	0.87
May 6	0.16	0.18	-7.23	-2.50	-0.95	-0.77	2.30	0.58

Table 2

Abnormal Returns (AR) and Cumulative Abnormal Returns (CAR) for Coca-Cola and Pepsi
Commencing with the Return of the Original Formula

Date	Coca-Cola			Pepsi				
	AR	T-stat	CAR	T-stat	AR	T-stat	CAR	T-stat
July 10	2.89	3.22			-1.78	-1.45		
July 11	2.80	3.13	5.69	4.48	2.33	1.90	0.56	0.32
July 12	-1.63	-1.82	4.06	2.60	0.76	0.62	1.32	0.62
July 15	-1.97	-2.20	2.09	1.16	-0.27	-0.22	1.05	0.42
July 16	0.71	0.79	2.80	1.38	-0.67	-0.55	0.37	0.14
July 17	-0.15	-0.16	2.66	1.20	-0.73	-0.59	-0.35	-1.15
July 18	-0.12	-0.13	2.53	1.05	-0.79	-0.64	-1.14	-0.35
July 19	0.39	0.43	2.92	1.14	-0.04	-0.03	-1.18	-0.34
July 22	-1.16	-1.30	1.76	0.64	-0.61	-0.50	-1.79	-0.48
July 23	-1.48	-1.65	0.28	0.10	0.70	0.57	-1.09	-0.28

THE IMPACT OF THE INTRODUCTION OF NEW COKE

ON THE ABNORMAL STOCK PRICE PERFORMANCE OF COCA-COLA AND PEPSI

