Failing to Suspect Collusion in Price-Matching Guarantees: Consumer Limitations in Game-Theoretic Reasoning

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Marketers often commit to matching competitors’ prices by offering price-matching guarantees (PMGs). Theory, however, shows that PMGs can either foster price competition and lower market prices or facilitate price collusion and raise market prices. In 3 experiments, we tested if consumers suspect collusion in such tactics and if this suspicion in turn affects their preferences for PMGs. Experiment 1 showed that consumers prefer markets where sellers offer PMGs over those that do not, suggesting little or no suspicion of collusion. Experiment 2 replicated these findings and extended them by showing that although most consumers prefer PMG markets, consumers higher in need for cognition (NFC) do, consistent with the greater suspicion hypothesized, prefer PMG markets more weakly. However, this weakened preference emerged from concerns over lower product quality in PMG markets more so than expectations of unduly high prices. Experiment 3 then tested the collusive potential of PMGs by placing participants in the role of a government regulator charged with finding collusion in various markets. Regardless of explicit primes and NFC, participants perceived PMGs as competitive devices that reduce prices rather than collusive devices that raise them. In contrast to the assumptions underlying game-theoretic models, consumers often lack the strategic sophistication necessary to detect the collusive potential of PMGs, a limitation that implicates legislation to moderate the use of such devices.

Sellers ranging from airlines to consumer electronics often promise they will match or beat a competitor’s (lower) price if consumers can find one (e.g., Delta® Airlines will match fares of rival ValuJet® on some seats, Circuit City will refund 110% of the price difference, etc.). Why these apparent competitive tactics produce lower or higher prices, however, is a matter of perspective. From the vantage point of information economics, price-matching guarantees (PMGs) are competitive signals that separate lower priced and higher priced sellers because given the costs of sending false signals (e.g., refunds), only the lower priced sellers can profit by offering PMGs (e.g., Biswas, Pullig, Yagci, & Dean, 2002). However, in game-theoretic terms, PMGs help sellers tacitly collude to raise prices because given all sellers adopt them, PMGs eliminate incentives to reduce prices (e.g., Salop, 1986). For this reason, researchers have suggested that legislation may be needed to police PMG applications (e.g., Edlin, 1997), although this
overlooks the possibility that consumers, suspecting that PMGs are collusive devices, can act on their mistrust with appeals to government and or the media.

We report three experiments that assessed people’s suspicions about and preferences for PMGs. The results hold implications for both theory and practice. If consumers suspect collusion in price-matching offers, the findings will support game-theoretic models that assume people are sophisticated enough to think through multiple possibilities and outcomes for multiple players engaged in prisoner’s dilemma type of pricing games (e.g., Brandenburger & Nalebuff, 1995). The results would also undermine calls for legislation to curb PMG practices because they would suggest that consumers are capable of subverting PMG-based collusion by boycotting PMG stores or appealing to authorities on an ad hoc basis regarding lost consumer welfare (Edlin, 1997). On the other hand, if consumers do not suspect collusion in price-matching offers, the findings would contribute to research suggesting that people sometimes fail to command the strategic foresight commonly assumed in game theory (see Camerer, 1991). Such failures to suspect collusion would also make consumers susceptible to PMG-based collusion and thereby fuel arguments for legislative control (Edlin, 1997; Sargent, 1993).

Suspecting seller strategies, however, is likely to depend on the strategy in question as well as the individual consumer. For fairly simple strategies of price discounts (e.g., seasonal sales), consumers can often identify when and how sellers should offer discounts and act accordingly (Friestad & Wright, 1994). For less obvious strategies, however, variations across consumers are likely. Nagel (1995), for example, showed how even a fairly simple game is played with as many as four distinct levels of sophistication. In the case of PMGs, consumers would have to be intelligent enough and motivated enough to see how sellers can use PMGs to collude tacitly. Because these underlying dynamics may not be obvious to all consumers, we suggest that their suspicion will be driven at least partially by the consumer’s need for cognition (NFC) or proclivity to engage in and enjoy effortful thinking (Cacioppo & Petty, 1982; Cacioppo, Petty, Kao, & Rodriguez, 1986). Inman, McAlister, and Hoyer (1990), for example, found NFC to be positively correlated with consumer detection of an absence of price discounts on items located in end-of-aisle displays.

We therefore conducted three experiments to assess consumer suspicions about and preferences for PMGs. Experiment 1 tested whether consumers preferred markets where some or all stores offer PMGs to markets where the stores make no such offers. Consumer expectations about price levels in the competing markets were measured as well. Experiment 2 replicated and extended this experiment in two ways: first by testing the moderating role of NFC and second by testing the possibility that PMGs reduce perceived quality (i.e., involve an unwanted confound). Experiment 3 provided a more direct test of collusion that eliminated any confounds from quality perception: Participants, imagining that they work for a regulatory agency charged with policing collusive pricing practices, judged the likelihood of seller collusion and higher prices in three markets that differ in their signaling tactics.

The three experiments converge on the following conclusions. First, consumers saw PMGs as competitive devices that signal (a) lower prices and, at times, (b) lower quality. Second, consumer suspicion of collusion in PMGs was minimal, with higher NFC associated with, at best, a modest increase in suspicion.

**THEORY AND RESEARCH**

**Conflicting Predictions of PMG Effects**

Intuition suggests that sellers willing to match or beat the market’s lowest price probably offer those prices already themselves. If not, they risk significant losses in two forms: (a) lost margins from refunds and (b) damaged reputations from negative word of mouth. This type of thinking is codified in information economics in which PMGs are likened to market signals (e.g., Biswas et al., 2002).2 Cognizant of the costs associated with sending false signals, sellers are unlikely to promise PMGs unless they are confident they have the lowest price in the market. The upshot is that PMGs signal lower prices, enhance competition, and help improve consumer welfare.

Economists and legal scholars, however, have pointed out that PMGs adopted by multiple sellers can hinder competition by removing sellers’ incentives to lower prices (for work in economics, see Baye & Kovenock, 1994; Belton, 1987; Png & Hirshleifer, 1987; Salop, 1986; Zhang, 1995; for work in law, see Sargent, 1993). Consider two sellers, A and B, who are selling identical products. The best (cooperative) solution is that both sellers price high and maximize their joint profits. This cooperative solution, however, is untenable because there is always an incentive for any one seller to unilaterally lower its price and capture the bulk of the market. Therefore, the Nash Equilibrium solution to the game is for both sellers to price low, close to their marginal costs (say, $200).

PMGs, however, alter fundamentally this game’s dynamics. If each seller guarantees to match the other’s price and if both are priced comparably and significantly above marginal costs (say, $400), there is no longer an incentive to lower prices. If A tries to steal share by reducing its price, B’s price automatically adjusts to minimize losses such that both sellers then suffer from reduced margins. If, on the other hand, PMGs are simultaneously created by A and B when both are priced at just above marginal costs, the guarantees allow savvy sellers to raise prices slowly with the knowledge that their PMG discourages competitors from lowering prices. This disincentive to price reductions allows sellers to sustain

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2We define *signal* after Porter (1980) as “any action by a competitor that provides a direct or an indirect indication of its intentions, motives, goals, or internal situation” (p. 75).
a cooperative/collusive solution that inflates prices and profit margins beyond what we would expect in purely competitive markets.

An early empirical study (Hess & Gerstner, 1991) assessed weekly price data of 114 supermarket products, 79 covered by PMGs and 35 not covered by PMGs. Although PMG-included prices increased more rapidly than did PMG-excluded prices, a pattern consistent with PMGs promoting and sustaining artificially inflated prices, the study was conducted in a relatively short time span (1984–1986) and in a relatively small geographic area (five supermarkets in North Carolina) where controls for product-class differences in price inflation were unavailable (i.e., the lack of overlap between the PMG and non-PMG products meant that the authors could not compare a given product’s prices when it was and was not covered by a PMG).

Laboratory experiments on PMGs, a fairly recent development, have typically shown that consumers associate PMG stores with lower prices or better values compared to non-PMG stores (Biswas et al., 2002; Jain & Srivastava, 2000; Srivastava & Lurie, 2001). Although these findings lend support to the competition interpretation of PMGs, none of the experiments tested if PMGs are perceived as collusive devices or if tendencies to see PMGs in this light vary across consumers and product classes.

Heterogeneity in PMG Effects Across Consumers and Product Classes

Although theory and research suggest that PMGs might either help or hinder competition, neither theory nor research considers the possibility that PMG perceptions vary across consumers and product classes. Some consumers may be persuaded easily by PMGs, whereas other more thoughtful and vigilant consumers may not (e.g., Bobinski, Cox, & Cox, 1996). Similarly, for some consumers, PMGs may serve as a decision simplifying heuristic (e.g., when in doubt, select the store that offers PMGs), whereas for others PMGs may activate their “schemer schema” and other defensive mechanisms geared to resist persuasion (Friestad & Wright, 1994). Complicating matters is the possibility that just as PMGs signal lower prices to consumers, they can signal lower quality as well. For example, if PMGs are used primarily by discount stores, consumers may infer that stores invoking PMGs (a) carry lower quality brands, (b) carry only lower quality models of any higher quality brands they do carry, or (c) offer limited service for their brands. Such perceptions can undermine the appeal of PMGs to some consumers or enhance it among others (those not interested in more quality beyond a level already available).

The possibility that PMGs influence perceptions of quality as well as price raises additional issues: the potential for PMG effects to vary across product classes and perhaps even brands within a product class. For example, PMG effects on perceived quality should be greater when products/services involve less tangible features and are harder to judge (e.g., services such as automotive tune-ups) than when they involve more concrete features and are easier to judge (e.g., durable products such as cameras). Moreover, degradations in perceived quality should hurt brands positioned on quality and status (e.g., designer watches such as Movado™) more than brands positioned on functionality (e.g., everyday watches such as Timex®).

Empirical Tests of Heterogeneity: This Study

We report three experiments that tested if consumers suspect collusion in PMGs; if so, how PMGs affect price and quality perceptions; and if this suspicion/perception varies across consumers and situations. At issue is the consumer’s vulnerability to collusive devices as well as retailer incentives for attempting such collusion and the government’s resulting motivation to intervene. If consumers suspect the collusion in price-matching offers and act on their suspicion, they would not be vulnerable to PMG-based collusion and retailers would have little incentive to attempt it (and the government would have little reason for intervening; see Sargent, 1993). If, on the other hand, consumers see PMGs as signals of lower prices, consumer vulnerability to and retailer incentives for PMG-based collusion would be heightened, as would the government’s case for regulating PMG-based claims in the interest of consumer welfare.

Despite the gravity of such issues and our natural desire for a simple outcome, the reality is likely to be more complex. As noted previously, PMG-driven price perceptions may vary across consumers such that the suspicion of collusion depends on which market segment is targeted. Moreover, PMG effects on perceived prices may be offset and/or enhanced by effects on perceived quality, effects themselves that may vary across product classes and brands. In this study, therefore, we assessed price and quality perceptions across two types of consumer, one more inclined toward effortful thinking and one less so, and across two product classes, one whose quality is relatively easy to judge and one whose quality is not. We leave future research the study of potential differences across brands within product classes (e.g., status vs. functional brands) in the effects of price/quality perceptions on PMG responses.

OVERVIEW OF EXPERIMENTS

Pretest: Familiarity With PMGs

Thirty-four business students at a large northeastern university served as pretest participants. The purpose of the pretest was to ensure PMG familiarity among the student population from which we would draw participants.

Participants performed two tasks. First, they indicated their familiarity with five different types of retail promotion
on a scale ranging from 1 (not at all familiar) to 9 (very familiar), with a midpoint of 5 (neither familiar nor unfamiliar). We defined familiarity as “frequently seeing or hearing about such promotions.” The different promotions tested were direct discounts (x% off, $x off the regular price), free extra products (buy one, get the second free), price-matching guarantees (refund of the full difference if a lower price is found elsewhere), price-beating guarantees (refund of more than the full difference if a lower price is found elsewhere), and money-back guarantees (full refund if unhappy with the product for any reason). Second, participants recalled as many examples of PMGs as they could. They could recall a specific advertisement (e.g., “Nobody Beats Midas®”), a store that offered PMGs (e.g., Circuit City), or a product covered by a PMG at a particular store (e.g., cellular phones at Circuit City).

Familiarity scores ranged from 8.56 (direct discounts) to 5.29 (price-beating guarantees) across promotions. PMGs ranked third in familiarity ($M = 7.29$). When asked to recall PMG exemplars, participants recalled 51 instances of PMGs. Collapsing across advertisements, stores, and products, they cited consumer electronics most often (57%) followed by automotive repair services (14%).

The pretest produced three key findings. First, the targeted student population seemed reasonably familiar with PMGs in which familiarity was rated significantly above the scale’s midpoint of 5.0 ($M = 7.29$), $t(33) = 11.20$, $p < .0001$; and, on average, the number of exemplars recalled was greater than 0 ($M = 1.50$), $t(33) = 9.41$, $p < .0001$.

Second, the student population did not appear to be familiar with price-beating offers as much they were with price-matching offers ($M = 5.29$, not significantly different from the scale’s midpoint), $t(33) < 1$. For this reason, we limited the study to price-matching offers.

Third, an assessment of the PMG exemplars indicated that the population was most familiar with PMGs in the consumer electronics and automotive service fields. Hence, we created two market scenarios, one requiring choice of a 35-mm camera and the other requiring choice of an automotive garage to perform an engine tune-up on the individual’s car. These two situations permitted us to assess any differences in consumer reactions to PMGs across durable products in which quality might be relatively easy to detect and services in which quality might be more difficult to detect.

**Stimuli: Creating Experimental Markets**

The next step was to develop experimental markets that test the underlying theories of PMGs. Scenarios 1 and 2 (see Figure 1) describe two markets that we adopted in our experiments. Scenario 1 compared a single-PMG market (i.e., one store offered PMGs, the other did not) with a no-PMG market (i.e., neither store offered PMGs). Scenario 2 compared a dual-PMG market (i.e., both stores offered PMGs) with a no-PMG market.

The selection of the markets was driven by the game-theoretic prediction that equilibrium price in a duopoly where competing stores offer PMGs is higher than the
equilibrium price in a duopoly without such offers (Belton, 1987; Png & Hirshleifer, 1987). To assess if consumers suspected collusion and higher prices when PMGs are involved, participants chose between the two duopoly markets, one where some or all sellers offered PMGs and the other where sellers did not. The key measure was market (duopoly) choice, although we also measured participant’s expected price in the two markets.3

**EXPERIMENT 1**

**Hypotheses (Hs)**

In Experiment 1, we indirectly tested whether consumers see PMGs as collusive or competitive devices by assessing which market they preferred (one with PMGs or one without), as well as the price inferences they drew.

H1: Consumers will associate PMGs with higher prices and hence choose the market without PMGs over the market with PMGs (consumers viewing PMGs as collusive).

H2: Consumers will associate PMGs with lower prices and hence choose the market with PMGs over the market without PMGs (consumers viewing PMGs as competitive).

In Experiment 1, we also tested an implication of PMG theory by comparing single-and dual-PMG markets. If consumers suspect collusion in PMGs, they should be able to discern gradations in that potential as well. They should recognize that collusion and disincentives to price reductions when both retailers invoke PMGs is greater than when only one retailer invokes a PMG. On the other hand, if consumers see PMGs as competitive devices, they should see more price competition when both retailers invoke PMGs.

H3: Consumers will associate higher prices with the dual-PMG market compared to the single-PMG market and hence choose the single-PMG market more frequently than the dual-PMG market (consumers viewing dual-PMG markets as more collusive than single-PMG markets).

H4: Consumers will associate lower prices with the dual-PMG market compared to the single-PMG market and hence choose the dual-PMG market more frequently than the single-PMG market (consumers viewing dual-PMG markets as more competitive than single-PMG markets).

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3Researchers sometimes test whether consumers prefer a store that offers a PMG to a store that does not (e.g., Jain & Srivastava, 2000; Srivastava & Lurie, 2001). This procedure can measure consumer perception of PMGs when offered by a single seller. It cannot assess if consumers suspect collusion when multiple sellers offer PMGs.

**Method**

**Stimuli and measures.** Scenarios 1 and 2 summarize the experimental scenarios. The experiment varied (between-subject) product class (35-mm camera, automotive service) and choice set (Scenario 1, Scenario 2). We varied product class by asking half of the participants to imagine they were in the market for a 35-mm camera and the other half to imagine they were shopping for a garage to perform an automotive tune-up. Thereafter, we informed all participants that (a) the normal price of the camera (automotive service) was approximately $300, (b) the two markets were located equally far from where they live, and (c) they had time to visit only one market. Finally, we varied the choice set by asking half of the participants to choose between a single-PMG market and a no-PMG market (Scenario 1) and the other half to choose between a dual-PMG market and a no-PMG market (Scenario 2).

Once participants had made their choice (Market X or Market Y), they reported their price perception of the markets on a 9-point scale ranging from 1 (definitely lower at X) to 9 (definitely lower at Y), with a midpoint of 5 (about the same at X and Y). Thus, ratings above 5 indicated suspicion that PMGs involved higher rather than lower prices. Participants exposed to Scenario 1 and choosing Market X (the single-PMG market) were further asked their store choice (Store A, Store B) and the price perception of the stores on a similar 9-point scale.

**Participants.** One hundred and one students at a large northeastern university served as participants and received extra-credit points for their participation. They were randomly assigned to the four different experimental conditions resulting from the crossing of product class and choice set.

**Results**

**An integrated analysis.** H1 and H2 addressed how consumers assess PMG markets relative to no-PMG markets, which in this study involved within-subjects comparisons (a single rating scale assessing the relative price levels of the PMG and no-PMG market). H3 and H4, however, involved a between-subject comparison of dual against single PMG markets. To combine the within-subjects and between-subject components into a single model, we created an additional dependent measure to which each participant was assigned the score of 5.0, the indifference price-perception point. The resulting analysis of variance (ANOVA) model then included (a) a within-subjects factor (relative rating) that tested price perception ratings against the indifference value, and (b) between-subject factors that tested whether any resulting deviation from indifference varied across choice sets that differed in the number of stores in the PMG market. This integrated model focused attention on suspicions of PMG-based collusion (the within-subjects component) while asking if this
suspicion varied across experimental conditions. A similar approach was taken with the choice data as discussed shortly.

**Relative price-perception ratings.** Table 1 shows the relative price-perception ratings across markets and product class. We ran a mixed ANOVA with two between-subject factors, product class (camera, automotive service) and choice set (Scenario 1, Scenario 2), and the within-subjects factor relative rating (see previously). Recall that numbers less than 5.0 support the competition hypotheses, whereas numbers greater than 5.0 support the collusion hypotheses. The relative-rating effect supported H2’s prediction that consumers see PMGs as competitive devices that lower prices rather than as collusive devices that raise them \( (M = 4.68), F(1, 97) = 7.33, p < .01 \). This effect, however, was moderated by choice set, \( F(1, 97) = 3.62, p = .06 \). Participants expected prices in the PMG market to be significantly lower than those in the no-PMG market when a single seller invoked PMGs \( (M = 4.45) \) but not when multiple sellers did so \( (M = 4.90) \). Furthermore, in the single-PMG market, the PMG store was associated with significantly lower prices compared to the non-PMG store \( (M = 4.50), t(47) = 2.92, p < .01, \) significantly lower than 5.0. No other effects, including those of product class, were significant.

The fact that relative ratings were consistently below 5.0 or indifference suggests that consumers generally did not suspect any collusion in price-matching offers. However, the fact that multiple PMGs were seen as producing less, not more, price competition than single PMGs suggests that the use of PMGs by multiple sellers may have raised some suspicion of collusion in the minds of at least some consumers, a possibility tested in Experiment 2.

**Market preference.** Table 2 shows the choice/preference data across markets and product classes. As with the price-perception data, we tested the choice data using a mixed model. Product class (camera, automotive service) and choice set (Scenario 1, Scenario 2) were the two between-subject factors. We created a two-level within-subjects factor, relative preference, by assigning each respondent two choice/preference scores: (a) the actual choice reported by the respondent, recoded as 1 if the PMG market was chosen and 0 if the no-PMG market was chosen; and (b) an indifference preference rating of 0.5 for each respondent. Thus, the within-subjects effect indicated whether choice shares of PMG markets were significantly larger or smaller than 50% (H1 and H2), whereas the interaction of this factor with between-subject factors indicated whether any relative preference effects varied across experimental conditions such as choice set (H3 and H4). We estimated the model with a mixed model ANOVA applied to the choice/preference scores.

H2 predicted that consumers would see PMGs as largely competitive devices that lower rather than raise prices. The prediction was supported by a significant main effect of relative preference, \( F(1, 97) = 25.72, p < .0001 \). Seventy-two percent of the participants preferred PMG markets to no-PMG

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**Note:** PMG = price-matching guarantee.

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4Integrating the within-subjects and between-subject components in one model does not threaten the integrity of either component because the model captures the results produced by separate analyses (e.g., identical within-subjects \( p \) values for \( t \) tests of raw scores against 5.0).

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5Ordinary least squares (OLS) is often avoided with categorical dependent measures because extreme proportions (of 1s or 0s) violate the assumptions underlying OLS. However, when proportions are not so extreme, the relationship between raw proportions and the log-odds thereof is generally linear and OLS estimates based on raw proportions are comparable to log-linear models estimated with maximum likelihood estimation (MLE; Cleary & Angel, 1984). We used OLS to analyze the choice data for three reasons. First, we wished to integrate the within-subjects and between-subject factors as in the price-perception data (which requires the inclusion of the 0.5 indifference score). Second, the choice proportions in our data were not extreme (ranging between 18% and 82%). Finally, and third, the integrated model estimated here with OLS captured the findings produced by separate analyses (e.g., \( z \) tests of proportions against 0) and between-subject analyses estimated with MLE on log-transformed data.
markets. However, as with the price data, this effect was moderated by choice set, $F(1, 97) = 4.19, p < .05$. More participants chose the PMG market when only one seller invoked PMGs (82%), whereas fewer did so when both sellers invoked PMGs (63%).

Discussion

Both the price-perception and choice data suggest that consumers generally did not suspect any collusion in PMGs and saw them instead as competitive devices that reduce prices. However, the fact that dual-PMG markets were preferred less than single-PMG markets and perceived to have higher prices as well raises the possibility that more analytically inclined participants suspected collusion in the price-matching offers. This possibility is assessed more directly in Experiment 2 in which we collected self-reports of NFC from participants.

Two other features of Experiment 1 merit note. First, of the participants preferring the no-PMG market, exactly half expected the competing PMG market to have the same, if not lower, prices. Something other than price, therefore, was driving the decision of these participants. The possibility that these participants associated PMGs with lower and undesired levels of quality was tested directly in Experiment 2.

Second, preferences for the single-PMG market (relative to the dual-PMG market) might have been inflated by perceptions of greater store and product heterogeneity in the single-PMG market (e.g., perceptions of one discount store existing near one nondiscount store). Experiment 2 eliminated this potential confound by assessing, in addition to the no-PMG markets, only dual-PMG markets, those signaling potential collusion the best.

EXPERIMENT 2

Background and Hypotheses

Experiment 1 found that although consumers preferred PMG markets when one out of two sellers offered PMGs (82%), their preference was significantly weaker (63%) when both sellers offered PMGs. Because theory suggests that the collusive potential of PMGs arises primarily when PMGs are invoked by both sellers, we turned our attention in Experiment 2 to understanding precisely how and when multiple PMGs signal different things to different types of consumers and different types of product. First, we assessed how NFC affects consumer assessments of PMGs. Second, we investigated if, in addition to signaling price, PMGs signal product quality. Finally, and third, we examined if quality perceptions vary systematically across product classes differing in the ease with which product quality can be judged.

PMGs and the consumers’ NFC. To suspect collusion in PMGs would require a certain amount of analysis that only more thoughtful consumers might be willing to invest. In Experiment 1, the fact that dual-PMG markets were preferred less than single-PMG markets and perceived to have higher prices raises the possibility that some, perhaps the more analytically inclined, participants were suspicious of PMG-based collusion. We suggest that the individual difference variable NFC, which measures consumers’ proclivity to engage in and enjoy effortful thinking (Cacioppo & Petty, 1982; Cacioppo et al., 1986), is particularly well suited to capture this hypothesis.

Two findings from prior research support the importance of NFC in perceptions of PMGs and their potential collusive potential. First, lower NFC consumers are typically “cognitive misers” who often use promotional cues in the simplest of fashions without making the effort, for example, to see if signals of price discounts involve actual price discounts themselves (Inman et al., 1990; Inman, Peter, & Raghunibh, 1997). The implication is that these consumers are likely to use PMGs as simplifying heuristics that indicate price competition rather than suspect that PMGs are disincentives to price reductions and drivers of higher prices. Higher NFC consumers, on the other hand, are more likely to respond to PMGs with greater thought, thinking that may lead them to suspect collusion in price-matching offers.

Second, suspecting collusion in PMGs and acting on the suspicion requires that consumers desire, and are therefore willing to search for, multiple pieces of price information (e.g., prices at competing stores). Past research has shown that lower and higher NFC consumers differ in their desire for external information and, consequently, the thoroughness of their decision strategies. Higher NFC consumers, for example, expend more cognitive effort on information search compared to their lower NFC counterparts (Verplanken, Hazenberg, & Palenewen, 1992), even when such cognitive thoroughness is unwarranted (Bailey, 1997). Higher NFC consumers, therefore, appear to be better suited for mentally simulating the multiple possibilities and outcomes of two sellers who offer PMGs (similar to the prisoner’s dilemma game), and therefore are more likely to suspect collusion in price-matching offers.

H5: Higher NFC consumers will demonstrate weaker preferences for markets involving PMGs than will lower NFC consumers.

PMGs as a signal of lower quality. Our analysis of quality-based effects of PMGs was motivated by two things. First, in Experiment 1 we found that of the participants preferring the no-PMG market, half expected the competing PMG market to have the same, if not lower, prices. Something other than price, therefore, was driving the decision of these participants (e.g., PMGs signal lower and undesired levels of quality). Second, research in information econom-
conomics has suggested that consumers often use market signals to draw inferences about product quality (see Kirmani & Rao, 2000, for a comprehensive review). For example, Wiener (1985) showed that warranties signal reliability of durable goods, a finding that Boulding and Kirmani (1993) qualified to hold only for reputable firms. Similarly, PMGs too can signal lower quality (e.g., PMG stores stress on price and skimp on quality). If true, PMG effects on quality perceptions are likely to depend on the product class under consideration. Such quality perceptions are likely to be stronger when products/services involve less tangible features that are harder to judge (Tellis & Wernerfelt, 1987).6 Because cameras are easy to study and understand, consumers should be able to judge their quality before purchase and remain relatively immune to the sellers’ price/quality signals. Moreover, because cameras are branded products and assuming that the same brand is sold across PMG and non-PMG stores, price-matching signals should not affect their quality perceptions. In contrast, because automotive service is mostly an experience product (difficult to evaluate a priori), consumers are likely to find the task of judging quality relatively more difficult and thus be more susceptible to sellers’ price/quality signals.

H6: PMGs will reduce perceived quality more within automotive repair services than within 35-mm cameras (consumers use PMGs as a signal of lower quality among products whose quality is difficult to judge more than among products whose quality is easier to judge).

Method

Stimuli and measures. The stimulus materials and measures were similar to those of Experiment 1 with four exceptions. First, participants compared only a dual-PMG market to the no-PMG market (Scenario 2), a comparison that better assesses the collusive potential of PMGs. Second, to offset any consumer speculation about product assortments across the two markets, participants were told that the two markets offered the same menu of products (services). Third, in addition to price, participants reported their quality perceptions on a 9-point scale ranging from 1 (definitely lower at market X) to 9 (definitely lower at Y), with 5 (about the same at X and Y) as the midpoint. Finally, and fourth, as part of an unrelated exercise, participants completed an 18-item NFC scale (Cacioppo, Petty, & Kao, 1984). The items included statements like “I would prefer complex to simple products” and “Thinking is not my idea of fun” (reverse scaled). Participants answered each item on a 9-point scale ranging from –4 (very strong disagreement) to +4 (very strong agreement). We created a composite NFC score for each respondent by averaging the items (α = 0.88).

Participants and procedure. Eighty-eight students at a large northeastern university served as participants and received extra-credit points for their participation. Participants were randomly assigned to the two product-class conditions (camera, automotive service). The order of presentation of the dependent measures (choice, price, and quality) was counterbalanced between participants. No order effects emerged.

Results

We separated participants into lower and higher NFC groups based on a median split of the raw NFC scores (ns of 43 and 45 in the low and high group, respectively). Following the split, the average NFC score was –0.03 for the low group and 1.77 for the high group on a scale ranging from –4 to +4. This dichotomy allowed us to look at the average price/quality/choice scores of the lower and higher NFC participants (Tables 3, 4, and 5). In all analyses, however, we treated NFC as a continuous variable.

Relative price-perceptions. Table 3 shows the relative price scores across products and NFC. As in Experiment 1, we created an additional dependent measure to which each participant was assigned the score of 5.0, the indifference price-perception point. Thus, the resulting ANOVA model had three parts: (a) a within-subjects factor (relative price rating); (b) a manipulated between-subject factor, product class (camera, automotive service); and (c) a continuous predictor, NFC.

Recall that ratings lower than 5.0 indicated support for the competition interpretation of PMGs, whereas ratings greater than 5.0 indicated support for the collusion interpretation of PMGs. The relative rating effect was significant and, consistent with Experiment 1, indicated that consumers viewed

<table>
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<tr>
<th>NFC</th>
<th>Camera</th>
<th>Automotive Service</th>
<th>All Products</th>
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<tbody>
<tr>
<td>Lower</td>
<td>25</td>
<td>4.44</td>
<td>18</td>
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<tr>
<td>Higher</td>
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<td>4.74</td>
<td>26</td>
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<td>4.57</td>
<td>44</td>
</tr>
</tbody>
</table>

Note. Scores were obtained on a 9-point scale, from 1 (prices are lower at PMG markets) to 9 (prices are lower at no-PMG markets), with 5 (prices are the same at the two markets) as the midpoint. NFC = need for cognition; PMG = price-matching guarantee.

6Although PMGs can impact how the consumer feels about the store environment (e.g., poor customer service, long check-out lines, badly lit aisles, etc.), such perceptions should apply equally to the two products in our experiment.
PMGs as a competitive device that lowers prices and not as a collusive device that raises them \((M = 4.23)\), \(F(1, 84) = 10.74, p < .005\). However, H5’s prediction that higher NFC participants would be more likely to associate PMG markets with higher prices was not supported, interaction \(F(1, 84) < 1\) \((M_{\text{Higher NFC}} = 4.20, M_{\text{Lower NFC}} = 4.26)\).

**Relative quality perceptions.** Table 4 shows the relative quality scores across products and NFC. To test for the quality effects of PMGs, we created an additional dependent measure to which each participant was assigned the score of 5.0, the indifference quality-perception point. Thus, as with the relative price analysis, the resulting ANOVA model had three parts: (a) a within-subjects factor (Relative Quality Rating); (b) a between-subject factor, Product Class (camera, automotive service); and (c) a continuous predictor, NFC.

Recall that a relative-quality rating less than 5.0 indicated that PMGs were associated with inferior quality, whereas a rating greater than 5.0 indicated that PMGs were associated with superior quality (relative to the no-PMG market). The relative rating effect was not significant \((M = 4.77)\), \(F(1, 84) = 2.24, p > .10\), suggesting that consumers in general did not make any quality associations with PMGs. H6’s prediction that PMGs signal lower quality for the service product (automotive tune-up) more than for the consumer-durable product (camera) was not supported, although the means were directionally consistent with the prediction \((M_{\text{Automotive Service}} = 4.57; M_{\text{Camera}} = 4.98)\), interaction \(F(1, 84) = 2.06, p > .10\).

There was, however, a significant Relative Quality \(\times\) Product Class \(\times\) NFC three-way interaction, \(F(1, 84) = 4.27, p < .05\). Explicating the interaction shows that H6 held only among higher NFC participants who were, in fact, more likely to infer lower quality from PMGs when a service was involved rather than a tangible product \((M_{\text{Automotive Service}} = 4.31; M_{\text{Camera}} = 5.11)\), \(t(43) = 2.05, p < .05\). Furthermore, testing the quality scores against indifference or the scale’s midpoint shows that higher NFC participants attached significantly less quality to the service product once a PMG was used, \(t(25) = 2.18, p < .05\), but not to the durable product, \(t(18) < 1\) (see Table 4).

**Market preference.** Table 5 shows the choice/preference data across products and NFC. As in Experiment 1, we tested the choice data using a mixed model ANOVA with product class and NFC as predictors, and a two-level within-subjects factor, relative preference. Each participant received two relative preference scores: (a) the actual score reported by the participant, recoded as 1 if the PMG-market was selected and 0 if not; and (b) an indifference rating of 0.5 for each participant. The within-subjects effect then indicated whether choice shares of PMG markets were significantly different from 50%, whereas the interaction of this factor with the predictors indicated whether any relative preference effects varied across product class and NFC.

The within-subjects effect (relative preference) was significant, \(F(1, 84) = 66.06, p < .0001\), and consistent with Experiment 1 shows that most participants (83%) preferred PMG markets over no-PMG markets. H5’s prediction that lower NFC consumers prefer PMG markets more than higher NFC consumers was weakly supported. The interaction between relative preference and NFC approached significance, \(F(1, 84) = 2.78, p = .10\). Lower NFC participants selected the PMG market more frequently (88%) than higher NFC participants (78%). There were no other significant effects.

**Discussion**

Whereas Experiment 1 suggested that multiple PMGs might heighten suspicions of PMG-based collusion among more thoughtful consumers, Experiment 2 suggested otherwise. Data on price perceptions show that dual PMGs reduce the appeal of PMG among consumers independent of their NFC. Data on quality perceptions show that PMGs signal inferior quality rather than higher price among higher NFC participants for the product more difficult to judge (automotive service).

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**TABLE 4**

<table>
<thead>
<tr>
<th>Product Class</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Camera</td>
<td>Automotive Service</td>
<td>All Products</td>
</tr>
<tr>
<td>NFC</td>
<td>n</td>
<td>M</td>
<td>n</td>
</tr>
<tr>
<td>Lower</td>
<td>25</td>
<td>4.88</td>
<td>18</td>
</tr>
<tr>
<td>Higher</td>
<td>19</td>
<td>5.11</td>
<td>26</td>
</tr>
<tr>
<td>All participants</td>
<td>44</td>
<td>4.98</td>
<td>44</td>
</tr>
</tbody>
</table>

*Note. Scores were obtained on a 9-point scale, from 1 (quality is inferior at no-PMG markets) to 9 (quality is inferior at no-PMG markets), with 5 (quality is the same at the two markets) as the midpoint. NFC = need for cognition; PMG = price-matching guarantee.*

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**TABLE 5**

<table>
<thead>
<tr>
<th>Product Class</th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Camera</td>
<td>Automotive Service</td>
<td>All Products</td>
</tr>
<tr>
<td>NFC</td>
<td>n</td>
<td>M</td>
<td>n</td>
</tr>
<tr>
<td>Lower</td>
<td>25</td>
<td>.88</td>
<td>18</td>
</tr>
<tr>
<td>Higher</td>
<td>19</td>
<td>.79</td>
<td>26</td>
</tr>
<tr>
<td>All participants</td>
<td>44</td>
<td>.84</td>
<td>44</td>
</tr>
</tbody>
</table>

*Note. PMG = price-matching guarantee; NFC = need for cognition.*
The findings, to this point, suggest that consumers generally fail to suspect collusion in PMGs. However, these tests assess collusion in situations in which consumer suspicion, if any, would have to be relatively spontaneous. The next experiment provided a more liberal test of the ability to detect collusive potentials by sensitizing participants to such potentials.

EXPERIMENT 3

In Experiment 3, we had consumers address price collusion explicitly. Participants imagined working for a regulatory agency where they were charged with assessing the collusive potential of three markets: a market where stores did not offer PMGs, a market where both stores offered PMGs, and a market where sellers openly resorted to press conferences to signal their prices to their competitors. Scenario 3 (see Figure 2) describes the three markets.

Hypothesis

As discussed in Experiment 2, we believe that consumers’ tendency to associate competition/collusion with PMG markets will vary with their NFC, with higher NFC consumers more likely to suspect collusion in PMGs. Hence, the following hypothesis was made:

H7: Higher NFC consumers will be more likely to associate collusion and higher prices with PMG markets compared to their lower NFC counterparts (consumer perception of PMG-based collusion varies with NFC).

Method

Stimuli, procedure, and measures. Participants imagined that they worked for the U.S. Federal Trade Commission and that one of their jobs was to investigate markets for potential collusion or cooperation on pricing. Collusion, the stimulus booklet explained, means “businesses discussing pricing to sustain artificially high market prices, sometimes done with businesses openly discussing prices, or sometimes done implicitly by businesses sending market signals to each other.” On the first page of the booklet, participants read about the three markets under investigation (Scenario 3). On the second page, participants read, one more time, about the market where collusion was explicit (i.e., stores holding sequential press conferences to announce price increases). They then rated the extent to which they thought that the stores in this market were either cooperating or competing on prices. The scale ranged from 1 (cooperating, which tends to raise prices) to 9 (competing, which tends to lower prices), with 5 (neither cooperating nor competing) as the midpoint. Participants read about the other two markets on the third and fourth pages and rated each market’s collusive potential. The order of presentation of the last two markets, as well as that of the products in these markets (cameras in Market X and automotive service in Market Y vs. automotive service in Market X and cameras in Market Y) was counterbalanced across participants (no order effects emerged). We measured NFC with the procedure used in Experiment 2 and created a composite NFC score for each participant by averaging the 18 items ($\alpha = 0.84$).

Participants. Forty-four students at a large northeastern university served as participants and received extra course credits for their participation.

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**Scenario 3**

<table>
<thead>
<tr>
<th>Market with PMG’s</th>
<th>Market with Press Conferences</th>
<th>Market without PMG’s or Press Conferences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market X has two stores, A and B. Stores A and B guarantee that they will match each other’s price by offering price matching guarantees. For example, if Store A advertises a price lower than that of Store B, then Store B will match that price. Similarly, if Store B advertises a price lower than that of Store A, then Store A will match that price.</td>
<td>Market Z has two stores, A and B. In January, Store A held a press conference to announce a 3.7% increase in the price of all products. A week later Store B held a press conference to announce a 4% price increase on all products. Subsequently Store A held another press conference to announce a revised 4% increase in the price of all products.</td>
<td>Market Y has two stores, A and B. Stores A and B do not hold press conferences to announce price changes, nor do they offer to match each other’s price. For example, if Store A advertises a price lower than that of Store B, then Store B does not offer to match that price. Similarly, if Store B advertises a price lower than that of Store A, then Store A does not offer to match that price.</td>
</tr>
</tbody>
</table>

FIGURE 2 \ Scenario 3.
Results
To be consistent with the first two experiments in which ratings less than 5.0 implied lower prices and competition and ratings greater than 5.0 implied higher prices and collusion, we subtracted the collusion/competition ratings from 10. Thus, adjusted ratings greater than 5 reflected perceptions of collusion and higher prices. We separated participants into lower and higher NFC groups based on a median split of the raw NFC scores (ns of 22 in each group). Following the split, the average NFC score was 0.33 for the low group and 1.96 for the high group on a scale ranging from –4 to +4.

Table 6 summarizes the relative competition/collusion of the two groups across the three different markets. Both lower and higher NFC participants suspected collusion in the market where stores openly cooperated through press conferences (ratings > 5.0, last column of Table 6). This serves as a check against the possibility that lower NFC participants, unlike their higher NFC counterparts, did not understand the concept of collusion in markets.

To test H7, we ran a mixed model with NFC (continuous variable, mean centered) as the between-subject factor and a three-level within-subjects factor we call market (competition/collusion ratings of the market with PMGs, the market with press conferences, and the market without PMGs or press conferences). The market effect was significant, F(2, 84) = 51.54, p < .0001. The perception of competition and lower prices was strongest in the PMG market (M = 2.43), followed by the market without PMGs or press conferences (M = 4.73) and the market with press conferences (M = 6.70).

The interaction between NFC and market was not significant, F(2, 84) = 1.76, p > .10. However, given H7’s a priori focus on the PMG market, we assessed NFC effects separately within each of the three markets. Note that (after the scale transformation) ratings less than 5.0 implied perceived competition and ratings greater than 5.0 implied perceived collusion. No NFC effects emerged in the press-conference condition (M_{Lower NFC} = 6.91; M_{Higher NFC} = 6.50), t(41) < 1, or in the market without press conferences or PMGs (M_{Lower NFC} = 4.91; M_{Higher NFC} = 4.45), t(41) < 1. However, and consistent with H7, NFC effects emerged in the PMG market. The tendency to associate collusion and higher prices with the PMG market was significantly stronger among higher NFC participants (M = 3.00) than lower NFC participants (M = 1.86), t(41) = 2.46, p < .05. However, the fact that the means were below the scale’s midpoint even among the higher NFC participants suggests that suspicion of collusion was minimal.

Discussion
Experiment 3 introduced an experimental procedure designed to sensitize participants to collusion in markets and then asked them explicitly if collusion was likely to occur in those markets. Despite these methods, consumers generally did not suspect collusion in price-matching offers, even higher NFC consumers whom we would expect to be the most likely to do so.

**DISCUSSION**

As the nature of market competition changes from confrontation to cooperation (e.g., Brandenburger & Nalebuff, 1996), PMGs threaten to emerge as a collusive device. Yet only recently have consumer perceptions of PMGs been studied systematically (Biswas et al., 2002; Jain & Srivastava, 2000; Srivastava & Lurie, 2001). The three experiments reported here extend this early work by assessing if consumers suspected collusion when PMGs were offered by multiple sellers, if suspicion of collusion in price-matching offers varied with the consumers’ NFC, and if PMGs signaled inferior quality for products whose quality is difficult to judge.

**Key findings and implications.** The experiments show that consumers prefer shopping at markets that include PMGs over those that do not, and that they see PMGs as largely competitive devices that lower prices rather than as collusive devices that raise them. The implication is that although game-theoretic models suggest that multiple sellers using PMGs simultaneously discourage price competition, consumers are generally ill-equipped to recognize this dynamic and are, therefore, susceptible to PMG-based collusion and its artificially high prices. For game theorists, this means that people may often lack the intellectual capabilities to enlist the strategies and tactics likely to produce optimum solutions (see Brandenburger & Nalebuff, 1995; Camerer, 1991). Consistent

**TABLE 6**

<table>
<thead>
<tr>
<th>NFC</th>
<th>n</th>
<th>Market With PMGs</th>
<th>Market Without PMGs or Press Conferences</th>
<th>Market With Press Conferences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower</td>
<td>22</td>
<td>1.86*</td>
<td>4.91</td>
<td>6.91*</td>
</tr>
<tr>
<td>Higher</td>
<td>22</td>
<td>3.00*</td>
<td>4.55</td>
<td>6.50*</td>
</tr>
<tr>
<td>All</td>
<td>44</td>
<td>2.43*</td>
<td>4.73</td>
<td>6.70*</td>
</tr>
</tbody>
</table>

*Represents scores significantly different from indifference (or 5.0, the scale’s midpoint) at p < .05.

Note. Scores are based on a transformed 9-point scale from 1 (stores are competing with each other) to 9 (stores are colluding with each other), with 5 (stores are neither competing nor colluding) as the midpoint. NFC = need for cognition; PMG = price-matching guarantee.
with Nagel (1995), our findings suggest that people commonly fall well off the sophisticated thinking necessary to appreciate optimal solutions even in relatively simple situations. For consumer advocates, these findings provide ammunition to the argument that government intervention is required to help protect against PMG abuses (Edlin, 1997; Sargent, 1993). Nevertheless, we can find some solace in the fact that participants did not suspect collusion in PMGs even when forced to focus on this potential in Experiment 3. This fact raises questions about the likelihood that sellers themselves will detect this potential and act on it in concert.

Whereas consumers saw PMGs as largely competitive devices that reduce market prices, higher NFC consumers also tended to see PMGs as signals of lower quality for service products whose experience components make it difficult for consumers to assess quality. PMGs, therefore, may be either a positive or negative feature within a seller’s promotional arsenal depending on the seller’s goals and the perceptions of the targeted market segment. For frequently purchased products that do not entail much deliberation and for which consumers seek the best price, PMGs may aid sellers by bolstering the impression of lower prices. For top-of-the-line, expensive items that entail more thought prior to purchase and for high-end stores where high prices are used to signal superior quality, PMGs may hurt the seller by way of their association with lower quality.

**PMGs and information search.** Research has shown that, as long as search costs are low, PMGs spur search intention (Srivastava & Lurie, 2001), an intention perhaps driven by the belief that further search may uncover a lower price. Although we did not test for information search effects in our experiments, it is likely that differences in the consumer’s NFC can translate into different search strategies. Png and Hirshleifer (1987), for example, suggested that PMGs price discriminate between uninformed and informed customers. The uninformed consumers (tourists) do not know of existing lower prices and thus can end up paying a higher price at the PMG store. The informed customers (locals) know of the lowest price and pay so by invoking the guarantee at the PMG store. Although NFC does not measure demand for information, one might surmise that higher NFC individuals may also be those who would seek substantial information before making decisions, both about the price as well as the quality of the available products (e.g., Bailey, 1997). They are, therefore, less likely to stop searching when they encounter a store that offers a PMG. Similarly, how consumers go about their search for lower prices may vary across lower and higher NFC segments. Less thoughtful consumers, if tempted to shop for a lower price, should do so only among the stores that offer PMGs, the rationale being that PMG stores will have lower prices than non-PMG stores. The more thoughtful consumers, however, are likely to search for lower prices among both PMG and non-PMG stores.

**PMGs and marketing ethics.** In 1994, the National Advertising Review Board compelled Wal-Mart® to change its “Always the Low Price” slogan to “Always Low Prices” because the Board felt that Wal-Mart could not prove it always had the lowest price on every product (Deogun, 1996). PMGs introduce a similar dilemma. Stores offering PMGs never claim that they have the lowest price and yet provide consumers with a sense that they can avoid being “cheated” if they, in the future, happen to come across other stores with lower prices. The problem is that if all retailers offer PMGs, it may give shoppers a false sense of security that prices are low across all stores and that further price search is unnecessary when in reality, prices in PMG markets may be higher than those in non-PMG markets (Hess & Gerstner, 1991). Whether PMGs, then, constitute a deceptive marketing practice remains a question for each specific application.

**REFERENCES**


Accepted by Dawn Iacobucci.