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ABSTRACT

Using data from American magazines, we explore the relationship between subscription discounts and magazine characteristics. We focus in particular on those magazine features that might lead time-inconsistent consumers to wish to engage in commitment behavior. We find that for magazines whose payoff is in the future and/or that are meritorious for other reasons, subscription discounts are lower all else equal. This finding suggests that publishers may be able to set subscription prices in order to extract rents from consumers' willingness to tie their own hands in terms of their future reading.

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Recent work in behavioral economics argues that consumers have time-inconsistent preferences. If a desired behavior or product has upfront costs and delayed benefits, at the moment of action/purchase, the consumer will procrastinate because she weights the current costs too highly. Thus the future self and the current self may not share the same view about optimal consumption choices at a particular moment in time. Classic examples include the current self expecting that the future self will exercise, or save for retirement. (Della Vigna and Malmandier, 2002; Caplin and Leahy, 2001). When the future arrives, the person has a tendency to feel the action at hand is costly to undertake, and does not engage in the behavior she rationally wanted to engage in the day before. In some cases, consumers may be naïve and not realize that their future self will act differently than their current self wishes it would. In other cases, consumers may be "sophisticated" (O'Donoghue and Rabin, 1999) in that they are aware the future self will not behave optimally from the present self's point of view. The self-control problem leads these sophisticated consumers to take actions in the present to alter the consumption patterns they adopt in the future. (O'Donoghue and Rabin, 1999, 2000; Laibson, 1997). For example, a consumer might join a health club or arrange for automatic direct deposit into a retirement account. Read et al (1999) run an experiment allowing for pre-commitment to video rentals. They show that consumers who select movie titles several days in advance choose more "highbrow" films than consumers choosing a movie for immediate viewing. These examples and experiments illustrate one important feature of the behavioral model, namely when the current self anticipates that the future self may go astray, that present self may try to tie the hands of the self- to -come.

While this characterization of behavior certainly resonates with many of us, empirical work testing the behavioral model in real markets have been few, with the notable exception

of DellaVigna and Malmandier (2002) and several papers in the marketing literature (e.g. Wertenbroch (1998)). This paper applies a simple behavioral model of consumer decision-making to help explain pricing in the magazine industry. In particular, we are interested in the question of whether there is any evidence that the pricing structure adopted by publishers reflects the behavioral strategies of consumers trying to alter their own reading patterns. For example, do consumers "over-pay" for a subscription to the *New York Review of Books* to try to induce increased future reading?

The magazine market provides an exceptionally rich setting in which to explore the behavioral model. Most magazines are offered at both single newsstand price and at subscription rates, providing all issues of the magazine for a fixed future time period at a single fee. The existence of these two price forms means that the potential consumer can either make a simultaneous purchase/read decision or, by buying a subscription, can purchase now, for delivery and reading in the future. The availability of the subscription form clearly would allow a consumer to influence the behavior of his or her future self since it is a mechanism by which the future self is offered an issue at zero marginal cost. In this way, the magazine market is similar to the health club market explored by Della Vigna and Malmandier (2002).

At the same time, magazines are themselves quite heterogeneous along quality dimensions that are likely to influence the level of preference inconsistency over time. Some magazines — for example the *New York Review of Books* or *Foreign Policy* -- may be ones for which a current self wishes to induce future consumption, while other magazines — perhaps *the National Enquirer* or *Star*– may instead be ones for which time inconsistency is not an issue. We consider several reasons why a consumer might want to read particular magazines. It may be an investment good in the sense of Della Vigna and Malmandier (2002) with a

payoff in the future, as opposed to enjoyment consumed concurrently with reading the magazine. A magazine may be seen as "meritorious" but perhaps not particularly enjoyable and thus be potentially subject to self-control issues. Though we distinguish between these magazine features in the abstract, in practice they are likely to be positively correlated across magazines. Our empirical strategy is to measure several magazine features that fit with the theory and show that the general result is present regardless of which is used.

Our experiment ties the behavioral literature to the field of Industrial Organization quite explicitly. If publishers recognize differences across magazines in these behavioral characteristics, one would expect them to set higher subscription prices relative to newsstand prices for investment good/meritorious magazines, those with a high level of consumer time inconsistency. Subscriptions to these magazines — because they are offering consumers a chance to tie their own hands via a subscription — require a lower discount than subscriptions to less "worthy" magazines to induce purchase of the subscription. The product heterogeneity in this market allows us to look across magazines to see whether or not the expected level of consumer time inconsistency is connected to differences in pricing structures, in particular the extent of a subscription discount.

One of the advantages of the magazine market over the health club market studied by DellaVigna and Malmandier is that, in the case of magazines, not only do we observe both newsstand and subscription prices, but both pricing forms are commonly used. Indeed, most of us buy magazines both via subscription and via newsstand purchase. However, our analysis does not *rely* on the same individual purchasing different magazines using different modes; our theory also holds if some types of consumers purchase subscriptions and others purchase from the newsstand. Secondly, there are many magazines on the market, all with

different investment good characteristics and different prices, yet all comparable in the newsstand versus subscription "products" that they offer.

Using a data set of almost three hundred U.S. magazines, we find strong evidence of higher subscription prices relative to newsstand prices for magazines for which time-inconsistency is likely to be an issue. Our results suggest that publishers are taking into account the desire of consumers to influence their own future reading patterns by charging higher subscription rates for more investment-type magazines than they can charge for pure consumption-type goods. Increasing our measure of "investment-ness" one standard deviation raises the ratio of subscription fees to newsstand prices by 4% on average. Alternatively, moving from a genre that's a non-investment genre to one that has investment characteristics increases the ratio of subscription to newsstand prices by about 12%.

The rest of the paper proceeds as follows. Section 2 provides a simple model of subscription discounts, including a behavioral component. Section 3 describes the data we have collected on magazine prices and characteristics. In Section 4 we describe our results, and Section 5 concludes.

2. A Simple Model

There are several papers in the literature that focus on the pricing structure of magazines, particularly on the existence of subscriptions. (Glazer and Hassin, 1982; Gabszwewicz and Sonnac, 1999). In order to account for the co-existence of subscriptions and single newsstand prices, it is necessary to introduce some heterogeneity in consumers. The previous literature introduces heterogeneity in two forms. First, consumers vary in the shape of their willingness-to-pay curve as a function of number of issues. In this case, subscription-pricing looks like bundling, and single, relatively high newsstand prices are offered to consumers with relatively steep demand curves while those with relatively flatter

demand curves buy the bundle via subscription. Alternatively, or in addition, consumers may vary in the transactions costs they face in purchasing single issues, perhaps because of their location. Consumers in isolated towns may have higher costs of finding a particular magazine, for example. In this case, publishers can capture part of the benefits of serving high transactions costs consumers via subscriptions.

Consider a situation in which a magazine offers consumer *j* the choice of a subscription providing n issues of magazine *i* at a fee S_i, or a single issue at a price p_i. Following the prior literature, we recognize that for any consumer to purchase the subscription, it must be true that

1. $S_i < p_i n_{ij} + c_{ij}$

Where n_{ij} is the number of issues the jth consumer wishes to purchase at price p_i and c_{ij} are the costs of acquiring magazines of type *i* for consumer *j*. Clearly from the point of view of the publisher, there are a range of possible combinations of newsstand prices and subscription prices that satisfy equation 1, and the publishers' task is to choose the optimal profit-maximizing combination conditional on the distribution of consumers and conditions involving production costs. Glazer and Haskin (1982) and Gabszwewicz and Sonnac, (1999) examine the properties of the equilibrium under some simple assumptions about demand and costs.

In the prior work in the literature, the number of issues of a given magazine that consumers wish to purchase is fixed *ex ante* for the individual. In particular, the individual consumer takes as given his or her optimal consumption level of the magazine and then, given the subscription rates, newsstand prices, and transactions costs, decides whether to buy the magazine at all and, if so, whether to subscribe or buy at the newsstand. Suppose alternatively, and in the spirit of the behavioral literature, that individuals have some

preferences about how many issues of a particular magazine they would like themselves to read in the future. One way to motivate this preference is by reference to the literature on time-inconsistent preferences. In particular, suppose that individuals have time-inconsistent preferences for immediate gratification in the spirit of Laibson (1997) or O'Donoghue and Rabin(2000), a characterization sometimes referred to as the "self-control" problem. Suppose further that individuals recognize these self-control problems, and act as behaviorally-sophisticated consumers in their purchases. In the current context, for a meritorious or investment-type magazine, some subset of consumers recognizes that their future self would under-consume issues from the perspective of their current self looking-forward. One way to capture this self-control problem is to posit that there exists an n_{ij}^* (as in equation 1 above) representing the number of issues the consumer at time t would like him or herself to buy and read at time $t+1$, and that for a meritorious or investment-type magazine, $n_{ij}^* > n_{ij.}$, for all p_i. In other words, the consumer will pay more for a subscription to a meritorious magazine today than he or she expects it will be worth *in the future* to his or her future self. But the current self finds it to be worth the price now in the expectation that the subscription purchase will induce incremental future reading and self-improvement. In some sense, the current self is buying both a flow of magazines and an enhanced chance of self-improvement. All else equal, publishers of these meritorious magazines should be able to extract the incremental consumer surplus associated with this self-improvement demand via higher subscription rates relative to the newsstand prices. Indeed, in this model it is even possible for the subscription rate to exceed the full newsstand price of all issues, even absent any costs of transactions. This can be seen in the formal constraint below (2). It is the same as in equation 1, plus an additional term which is the net surplus the consumer gains on each of the additional magazines that she consumes due to having the subscription.

2. $S_i < p_i n_{ij} + c_{ij} + (n_{ij}^* - n_{ij})(\upsilon_{ij} - p_i)$

Where υ is the value of any individual issue of magazine *i* to consumer *j*.

However, publishers are setting price for a total population of consumers, not all of whom are time-inconsistent and sophisticated. In the literature (O'Donoghue and Rabin 1999, 2000), there are two other types of consumers, naïve and rational. Both of these types believe that they will read the optimal (larger) number of magazines in the future. The rational types are correct, and their decision is represented by equation 1. The naïve types systematically under-consume but fail to notice that they are doing so. Being sure they will consume the correct number of issues at the time of the purchase decision, they place the same value on the subscription as the rational consumers. Returning to the publisher's problem, it appears that unless a very large majority of consumers are sophisticated, equation 1 will bind and determine subscription prices; a magazine's "investment good" nature will be irrelevant. However, in the magazine industry, advertising is a critical source of revenue and gives magazines an incentive to increase circulation. Thus subscription discounts are typically substantial, well below the binding constraint of equation 1. Publishers may therefore have the ability to charge higher subscription prices when their consumer base contains more sophisticated consumers without hitting the constraint for the naïve/rational consumers.

In the discussion thus far, we have focused on the case of the meritorious magazine that the consumer would like to commit to read. The model can also represent the case of a consumer who would like to commit not to read a particular magazine; in this case n^* will be less than n. However, we do not know of a market institution that can help the consumer with this problem by raising the effective marginal cost above the newsstand price. The best the consumer can do is avoid the lower marginal costs associated with a subscription, or only purchase a subscription if its price is appropriately low. In the empirical work we will try to

capture the difference between n and n^* - including its sign - and relate it to the subscription price.

In the motivation up to this point, higher subscription rates are induced by a desire of sophisticated consumers to increase their own consumption of investment-type magazines. There is an alternative, related, way of looking at this problem that in our case yields similar results. As we indicated earlier, in deciding to subscribe to a magazine, the consumer makes an estimate of expected future use. Suppose some naïve consumers are systematically biased, in the sense that they over-estimate how much they will wish to purchase meritorious magazines and how little they will wish to indulge in junk reading. Referring back to equation 1, under these circumstances consumers will be systematically over-estimating the number of magazines they wish to purchase: $n_{ij}^* > n_{ij}$. Under conditions where consumers imagine themselves to be "better" than they are, we will find similar results in terms of the subscription discount, this time driven by the naïve segment of the market. Consumers will be willing to pay higher-than-ex post-desirable subscription prices, not because they are trying to influence future behavior but because they systematically over-estimate how many magazines in the subscription they will read. The implied price per issue read that such a consumer calculates is systematically too low compared to actual behavior. Under these conditions, it is also possible for publishers to extract higher subscription prices as they capture the "imaginary" consumer surplus. Note in this case, however, absent some transactions costs, the subscription discount will never be negative since consumers will never imagine themselves to read more issues than exist.

Either of these two, quite simple, representations of behavioral decision making suggest that publishers of meritorious and/or investment type magazines can exploit the desire of consumers to either be better or believe themselves to be better by charging a high

subscription rate relative to the newsstand price. Note that the key feature of either model is that publishers can extract the incremental consumer surplus associated with either the desire to tie one's hands or a consumer's lack of self-awareness only in setting *the forward-looking* subscription price for meritorious magazines, not the spot price. In the next section we describe the data we use to test this hypothesis.

3. The Data

In order to test whether or not subscription rates for magazines can be in part explained by either of these simple behavioral stories, we collected data on almost 300 magazines published within the US. The principal sources of our data on magazine prices and circulation were ABC, the Audit Bureau of Circulation and the MRI, Mediamark Research Inc. Both are standard sources for work on magazine pricing (Koschat and Putsis, 2002). ABC collects data on readership and pricing from magazines, audits them for accuracy and then sells access to the audited data on their web site. The variables collected from ABC in the fall of 2002 form the core of the dataset. MRI is a standard source for demographic information on magazine readership. In the case of a few magazines, subscriptions appeared to require membership (e.g. *Audubon*, *American Legion*, *VFW Magazine*). We also found one magazine, *Mass Transit,* that, while it has a subscription and cover price, is mostly given away to people who work in the industry.[1] These were eliminated from the sample.

The magazines in the sample vary considerably in terms of the use of subscription sales. The mean percent of magazines sold on subscription was .81, with a range between .05 and 1. Note, of course, the percent of magazines sold on subscription overstates the number

[1] Circulation 20,500 of which 400 are paid and the rest free. (Conversation with Cignus Publications 9/8/03.)

of unique readers in a given year who are subscribers, given that subscribers by definition buy all issues of a magazine. Magazines with low use of subscriptions include many in the categories of weddings, gossip, women's general interest, and youth.

In addition to the ABC and MRI sources, we obtained some of the variables used from the magazines themselves. Using research funds and donations from friends, we assembled a magazine collection of 118 physical copies. The remaining magazines in the sample were examined either at major public libraries, large news carriers, or on web sites. Appendix A contains a listing of the magazines in the data set; the range of magazines is quite large, including large circulation, well known magazines like Time and Business Week as well as more esoteric magazines like Quilter's Digest and Gun Dogs.

Specification and Variable Construction

Recall that a sophisticated consumer will purchase a subscription if

$$S_i < p_i n_{ij} + c_{ij} + (n_{ij}^* - n_{ij})(\upsilon_{ij} - p_i)$$

Magazines can be scaled by creating a characteristic $\alpha_i \equiv \Sigma_j (n_{ij}/n_{ij}^*)$ that is an average across all consumers for a particular magazine. It is then straightforward to show that the constraint on the ratio of the subscription price per issue to the newsstand price decreases in α_i. In other words, as the number of desired issues diverges from the number of issues that will actually be consumed (absent a subscription), the subscription price can increase and the sophisticated consumer will still purchase it. The empirical specification we use therefore relates the subscription discount to measures of α for each magazine, while controlling for other features of the magazine that we think may have an impact on subscription ratios.

The empirical question in the paper centers on the size of the subscription discount. We do not want to use the absolute level of subscription price in our analysis because

magazines differ greatly in this characteristic. Rather, we use the ratio of the subscription price per issue and the newsstand, or cover, price. In practice, many magazines have multiple subscription rates, depending both on duration of the subscription and on special offers. In this paper, we use a one-year regular subscription rate, as identified in the ABC data. The dependent variable in the regression *Subratio* is defined as the subscription rate divided by the annualized newsstand price. Thus, a higher *Subratio* denotes a lower discount rate. In the data, *Subratio* varies from 0.16 to 1.25.

As we suggested in the last section, the economics literature on subscription pricing suggests two sources of variation in subscription price discounts: variation in the heterogeneity in the consumer willingness to pay function and variation in the transactions costs of newsstand purchase. We use several measures to capture these effects.

To proxy the transactions costs of acquiring particular magazines, we construct a variable called *Available***.** We sent research assistants to six cities across the US: New York City, Boise, Chicago, LA, Tulsa, and Houston. In each city, the research assistant noted whether the magazines were available at the largest public library and at a randomly chosen newsstand. The index runs from 0-12, with a mean of 4.7; the higher the index, the lower transactions costs of newsstand purchase. A second measure of magazine availability is the circulation level. All else equal, large circulation magazines will be available in more places. (As we will argue shortly , there is an offsetting effect on subscription prices from large circulation on the cost side.) The mean of circulation is 855,910, with a standard deviation of 1,472,923. Because of the large range of the circulation variable, we use *ln(circulation)* in the specification as well to capture non-linearities.

Measuring the underlying heterogeneity of the potential buying population is more difficult. Here, we look at several features of magazines. *NumberOfIssues* is the number of

issues of the magazine published in a given year, with a range from 4 to 52. For magazines with numerous issues all on the same topic, inducing purchase of all issues would be expected to require a deeper discount. Modifying this effect is the variable *NumIssues*Change,* which is the number of issues interacted with an indicator variable for whether the genre experiences a change in content regularly. We somewhat arbitrarily decided that these genres are news magazines, sports magazines, gossip magazines, magazines about technology, trade magazines, and general business magazines, comprising 21% of the total sample. We judged that the material in, for example, hobby, religion, and women's and men's general interest magazines was more static. For magazines with ample new content, we would expect less need for discounting as the number of issues rise, as those issues are less substitutable one for another.

As we noted earlier, magazines often have introductory offers for subscriptions as well as standard subscription rates. In cases in which publishers believe their magazines to be especially prone to habit-formation, low introductory rates, followed by higher subscription rates may be a preferred strategy. We take the ratio of the introductory offer to the regular offer, *Intro***,** as a measure of how habit-forming publishers believe their magazine to be. If this effect is important, low levels of *Intro* (deep introductory discounts) will be associated with high levels of regular subscriptions relative to newsstand prices. The introductory offer was taken from either the paper insert in the physical magazine, or the rate offered on the website.

In addition to the demand variables just described, there is a small trade literature that suggests that publishers of low circulation magazines may offer subscription discounts to improve product run planning. (Round and Bentick, 1997). The idea is that more subscriptions generate more certainty about the correct production level. As the circulation

of the magazine grows, demand from newsstands becomes smoother, and the benefit to having subscription sales for creating smooth demand falls somewhat. This literature provides a second interpretation of the coefficient on the circulation variable that is the opposite sign from the availability effect.. To the extent that the constructed variable *Availability* already completely captures the effect of transactions costs, we would expect this production smoothing effect to dominate and subscription prices relative to newsstand prices to rise with circulation.

An additional supply –side effect arises due to the two revenue streams, sales and advertising, that magazines can earn. The publisher has an incentive to increase circulation by lowering the price of a subscription relative to newsstand price because this distributes more magazines (even if they are unread) and thus boosts the value of ads in the magazine. We include the cost of a full page ad, *Adrate,* in the specification. It is calculated by taking ABC's full-page advertising cost measure and dividing by circulation to get a per reader cost.[2] As *Adrate* increases, publishers have more incentive to lower relative subscription prices to raise circulation.

We turn now to the variables of most interest, those capturing the magazine characteristics relevant to the behavioral distinctions we have made. Constructing such a variable is clearly very difficult; a magazine that seems like consumption to an economist—say *The Economist*, may feel like investment to a small businessman. In this work, we have relied on three separate indices of magazine character.

Our first variable, *Expert***,** is used to distinguish between magazines by many libraries. In distinguishing popular magazines from more serious or scholarly magazines, librarians ask whether the credentials of the author of the feature articles are provided, either in the header

[2] We do not have data on the number of pages or ad pages in a magazine and so cannot precisely calculate marginal ad revenue from one more sale.

of the article or in a footnote. For our measure, the listed credentials must be relevant to the subject at hand, and not simply biographical. For example, in a quilting magazine an expert footnote would read "Mary Smith has won three national prizes for her quilts," as compared to "Mary Smith lives in Connecticut with her husband and three children." This measure seems quite close to what behavioral economists might think of as an investment feature: if readers expect to learn from an article, they may well want to know the credentials of the source. *Expert* is an indicator variable, with one denoting the presence of expert content. It was generated by a research assistant who examined each magazine and applied the criteria described.

A second measure of magazine type is its genre. ABC provides extremely specific genres (e.g. "Golf" "Auto general interest: consumer" "fashion") We combined these into more meaningful larger groups (e.g. hobbies, autos, women's) until we were left with 25 genres (listed in the appendix). During this process, we separated out magazines that appeared to be geared for members of specific professions. This genre we called "trade." In addition, separately from genre, ABC describes a magazine as a trade or consumer publication. Almost all the business magazines are included in the "trade" definition, which we did not like for two reasons. First, it makes the category quite large, and second, many people read general business magazines as recreation or to plan for retirement, etc. So, we added only the non-business titles from the ABC trade category to our existing trade category (there was substantial overlap between the two groups). The other genres we thought *ex ante* should be investment goods or be meritorious are *Religion* and *Intellectual***.** All three of these genres are included in the final specification. All three are again indicator variables taking the value one if the magazine is designed for a particular career, (government worker, early childhood education, journalism for example), is about religion/spirituality

(*Theology Today*, *US Catholic, Yoga Journal*), or is a magazine of ideas (*Foreign Policy, Scientific American*). In our sample, 32% of the magazines have *Expert* content, 5% are *Trade* magazines, 4% are religious magazines, and 10% are intellectual magazines.

The third and fourth variables used, *Pride* and *FutureGain***,** were constructed from survey results of expert readers. Three Yale PhD students in the English Department, two women and one man, were trained by the authors and then asked to inspect all 300 magazines on the list and answer the following two questions:

1. Do you think the typical reader of this magazine is proud of his or her readership? That is, does the typical reader think better of him or herself by virtue of being a reader of this magazine? We are concerned with whether the typical reader is likely to be proud and not with the source or legitimacy of that pride. Please mark a 2 for very proud, 1 for somewhat proud and 0 otherwise.
2. Some magazines can be thought of as pleasures of the moment, while others teach us something important for the future. Consider for each magazine how much of the value of reading that magazine comes now versus in the future. Please rate the magazine as a 1 if all or most of the benefit of the magazine comes at the point of reading, up to a rating of 5 if virtually all of the benefits come in the future.

The second question is intended to get at the issue of impatience or time-inconsistency, while the first question speaks more to the over-optimistic, self-satisfied consumer model. We selected male and female readers to avoid any gender bias associated with rating different genres. In fact the three ratings were relatively highly correlated with each other, at a level of above 0.5 for all but two combinations of readers and ratings.[3] In the empirical work, the ratings of the three readers were combined to form our rating variable.

Pride is thus the sum of answers to question 1 and varies from 0 to 6 . The combined rating variables have a mean of 2.6 for question 1, with a standard deviation of

[3] Reader 3 had a correlation of .34 and .45 with readers 1 and 2 respectively on question 1 (pride).

1.7. *FutureGain* varies from 3 to 14, with a mean of 7 and a standard deviation of 2.4. *Pride* and *FutureGain* are positively correlated within a reader, as one might expect.[4]

Table 1 provides a list of magazines in the upper and lower tails of the rating distribution using the combined reader variables. Gossip and pornography magazines (e.g. *Cosmopolitan*, *Playboy*, *People*) are at the bottom of both scales - with principal benefits coming in the form of current pleasure and little pride of readership. *National Geographic* and *Diver* magazine are both pleasant to read yet contain content that is meritorious or useful in the future, so they are rated in the middle of both scales. *The New York Review of Books*, *Kiplingers*, and *The Nation,* all are rated quite high on both scales. On the other hand, there are clearly some magazines that are high on one level and not on the other. *Art and Antiques* for example, is rated high on the *Pride* scale, but only medium on *FutureGain* scale.

Clearly *Pride* and *FutureGain* suffer from the same defects as all subjective rating measures. The reasonably high correlation across readers was comforting, however.[5] In addition, the three measures of investment/merit used in this paper are all positively correlated: *Pride* and *FutureGain,* have correlations of 0.29 and 0.27 respectively with *Expert.*

The means of the dependent and independent variables used are provided in Table 1 along with the data sources for each variable. Appendix A provides the full list of magazines used with their two ratings given.

4. Results: Does Magazine Quality Matter?

4.1 Basic Results

[4] The correlations are .53, .66, and .72 for readers one, two, and three.
[5] The authors also rated the magazines and found their ratings correlated well (above .6) with the PhD student results.

The basic results in this paper are contained in Table 3 below. We include each behavioral variable separately in the four columns of the table. The non-behavioral variables all behave as we expect. Subscription prices relative to newsstand prices are relatively less (i.e. coefficient signs are negative) for magazines that are readily available, have small introductory discounts, have a large number of annual issues especially if their content does not change frequently, and charge high advertising prices. We combine the effects of both circulation variables and find that large circulation magazines, all else equal, offer lower discounts as the production-smoothing theory predicts.

Turn now to the behavioral variables. In all specifications, the behavioral variables are right-signed and all are significant at the five percent level or better. In particular, the behavioral effects have relatively large economic impact. In column one, having *Expert* content increases relative subscription rates by 0.053, which is a 9.5% increase at the mean of 0.553. Examining column 2, we see that subscription rates are highest for trade (career-oriented) magazines (.14), then the religious magazines (.13), then intellectual (.07), and all are positive relative to the remaining omitted genres. In the case of *Pride* rating in column 3, if each of the readers moved the magazine up one standard deviation on the "pride" scale, the subscription rate would rise by 0.0334 or 6%. In column 4, *FutureGain* has similar effects; one standard deviation higher on the *FutureGain* scale leads to an increase of 4.2% in the subscription ratio evaluated at the mean.

Some Alternative Explanations

One objection to the interpretation of the results provided thus far is that the behavioral variables may themselves be proxying for various demographic variables that might influence subscription rates. For example, suppose high-income people purchase

meritorious magazines and high-income people have a lower response (smaller elasticity) to subscription discounts. While we have no *a priori* reason to expect this relationship, it is possible to let the data speak to the issue. For approximately two-thirds of the magazines in the data set, we have information and the median income of the readership. (Unfortunately we do not have any information about the educational level of readers.) In Table 4, we use this sample to examine whether the effect of the behavioral variables disappears when we include demographic controls.

The first columns of Table 4 repeats the specifications in Table 3 with the smaller sample for comparability. We focus on our subjective ratings measures as we feel these variables most closely test the hypothesis of interest. Notice that the magnitudes of the coefficients on *Pride* and *FutureGain* fall by about 20% and their significance levels drop compared to the results with the full sample. The final columns of Table 4 show that median income level of the readers does not appear to explain subscription discounting. In addition, the unconditional correlation between income and *subratio* is not significantly different from zero. We conclude that income is not driving the relationship between magazine characteristics and subscription pricing. We do find that median income of a magazine's readers is unconditionally correlated with the magazine's *Expert*, *Pride*, and *FutureGain* ratings.

We also include the percentage of readers who are female (*PctFem*) in the regression, and note that this variable does have an effect on *subratio*. The more female readers a magazine has, the higher the subscription rate is relative to the newsstand price. It may be that women readers are more avid magazine readers than men on average and are therefore more willing to pay for subscriptions. More importantly from our perspective, including these demographic variables does not substantially alter the effect of *Pride* and *FutureGain;* statistical significance remains, and the magnitude of *FutureGain* increases slightly.

Note that in general, we should not be surprised to find that demographic characteristics of readers are associated with their patience or self-awareness, and therefore possibly with subscription price for the reasons we outline above. Neither income nor percent female reader appears to be a demographic that neatly captures impatience, and therefore neither substitutes for our behavioral measures. However, in principle, if one had better demographics, one could perhaps find a measure that would work in this way.

The fact that the percent female appears to affect subscription discounting led us to think further about the role of gender in this market. Previous work in economics suggests that in both experimental settings and in real world investment settings, there may be gender differences in personality traits that are relevant to commitment-type behavior. Barber and Odeon (2001) , for example find that men are more prone to over-confidence in stock market investments than are women. In an experimental setting, Chaudhuri and Gangadharan (2003) find that women are less trusting than men. We find the question of whether there are any differences in the tendencies of men versus women to try to commit themselves to be very interesting. We explore whether commitment to better magazine-reading through subscriptions varies by gender below.

Using the smaller data set for which demographic information is available , we created two interaction terms, *PctFem*FutureGain* and *PctFem*Pride,* interacting our two rating measures with percent female. Table 5 reports the results. In both specifications, the coefficient on the interaction term is negative and significant. The coefficient is large enough that, when evaluated at the mean of the percent female variable, it wipes out a large part of the effect of the behavioral variables.

It is interesting to speculate on the source of the gender difference we observe. There is a prior literature in the psychology area that suggests that women may have lower needs to

engage in hand-tying behavior. In particular, there are a number of studies indicating that women have what psychologists call enhanced *inhibitory* abilities; that is, they are better able to control their own impulses. (For a review and an evolutionary interpretation of this literature, see Bjorland and Kipp, 1996). Evolutionary psychologists have argued for a link between the need for parental investments in children and the development of an enhanced ability to delay gratification in women. In the economics literature of development, there is also evidence of differential parental investment by women. (Duflo, 2003). Alternatively, it may be that women are more naïve about their own need for self-control.

In the context of our analysis, the gender difference suggests that publishers will be less able to charge high subscription rates for meritorious women's magazines than for comparable men's magazines because women are less likely to pay for this commitment device.

5. Conclusions

While theories associated with behavioral economics have attracted considerable attention from economists the last few years, there has been very little work that tries to take these theories to traditional issues in Industrial Organization. In this paper, we apply the insights of the behavioral model to a traditional industrial organization problem: the setting of prices. Our results suggest that magazine publishers appear to be setting subscription prices to take advantage of time-inconsistency on the part of consumers. Magazines for which consumers might have a time-consistency problem and meritorious magazines have a higher ratio of subscription to newsstand prices than other magazines.

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Table 1: A Sample of Magazine Ratings

Pride=0	Pride=6	FutureGain=3	FutureGain>12
Penthouse	Art and Antiques	Penthouse	Forbes
Playboy	Art and Auction	Playboy	Fortune
Easy riders	Barron's	The Rolling Stone	HBR
Movieline	Business Week	Spin	Kiplingers
National Enquirer	Forbes	Vibe	Astronomy
National Examiner	Fortune	The Source	Worth
People	Harvard Business Review	Entertainment Weekly	Money
Premiere	Kiplingers	Interview	New York Review of Books
Soap Opera Digest	The New Yorker	Movieline	The Nation
Soap Opera Weekly	E-The Environmental Magazine	National Enquirer	Venture Reporter
Star	Architectural Digest	National Examiner	E-The Environmental Magazine
Starlog	American Heritage	People	Red Herring
TV Guide	Foreign Policy	Premiere	American History
True Story	NY Review of Books	Soap Opera Digest	Inc
US Weekly	Smithsonian	Soap Opera Weekly	
Cat Fancy	Economist	Star	
Traier Life	The Nation	Starlog	
Details	Faith & Family	Ttrue Story	
Maxim	Reform Judaism	US Weekly	
ESPN Magazine		Advocate	
Cosmopolitan		Details	
In Style		Maxim	
Marie Claire		Jet	
Amazing Spiderman		ESPN	
Cosmo Girl!		Amazing Spiderman	
Realms of Fantasy		Mad	
Teen		Realms of Fantasy	
Teen People		Teen People	

Table 2: Summary statistics and sources

Variable Name	*Mean*	*Std Dev*	*Min*	*Max*	*Source*	
	Number of observations=298					
Subratio	.553	.200	.163	1.24	ABC	
Circulation	855910	1472923	7600	1.6E7	ABC	
Ln(circulation)	12.7	1.46	8.94	16.56	ABC	
Available	4.74	2.84	0	12	Research assistant	
Number of issues	14.6	12.6	4	52	ABC	
Number of issues * change content	4.47	11.67	0	52	ABC & authors	
Intro subscription/ regular subscription	.821	.278	.219	2.84	Research assistant	
Ad rate	.060	.100	0	1.57	ABC	
Pride Rating	2.60	1.67	0	6	Reader rating	
FutureGain Rating	7.02	2.42	3	14	Reader rating	
Expert	.322	.468	0	1	Reader rating	
Trade	.050	.219	0	1	ABC & authors	
Religious	.040	.197	0	1	ABC	
Intellectual	.097	.297	0	1	ABC	
Demographic	**Mean**	**Std Dev**	**Min**	**Max**	**Observations**	**source**
PctFemale	.505	.288	0	1	N=210	MRI
Median Income	65152	24501	25984	202800	N=194	MRI

Table 3: Regression Results

Dependent Variable: One year subscription rate/ (newsstand price*number of annual issues)

Variable	*(1) Expert*	*(2) Genre*	*(3) Pride*	*(4) FutureGain*
Circulation	4.22E-08**	3.76E-08**	4.09^{E}-08**	4.19^{E}-08**
	(9.25E-09)	(9.14^{E}-09)	(9.17^{E}-09)	(9.26^{E}-09)
Ln(Circ)	-0.53**	-.043**	-.047**	-.052**
	(.011)	(.011)	(.011)	(.011)
Available	-.012**	-.012**	-.014**	-.013**
	(.004)	(.004)	(.004)	(.004)
Number of issues	-.0055**	-.0060**	-.0056**	-.0056**
	(.0010)	(.0010)	(.0010)	(.0010)
No. issues interaction	.0021	.0023**	.0022	.0020
	(.0011)	(.0011)	(.0011)	(.0011)
Intro offer	-.140**	-.160**	-.145**	-.144**
	(.037)	(.037)	(.036)	(.037)
Ad rate	-.276**	-.247**	-.278**	-.275**
	(.109)	(.107)	(.108)	(.109)
Expert	.054**	……..	……..	…..
	(.022)			
Trade	……	.136**	……	…..
		(.047)		
Religious	…….	.130**	……..	….
		(.051)		
Intellectual	……	.072**	…….	…
		(.035)		
Pride	…….	…….	.020**	….
			(.006)	
FutureGain	……..	…….	….	.0096**
				(.0043)
Constant	1.44**	1.33**	1.34**	1.38**
	(.139)	(.140)	(.144)	(.147)
No observations	298	298	298	298
Adj R^2	.273	.295	.282	.270

** significant at the .05 level or better
Standard errors in parentheses

Table 4: Adding Demographics using a Subset of the Sample

Dependent Variable: One year subscription rate/ (newsstand price*number of annual issues)

Variable	**(1)**	**(2)**	**(3)**	**(4)**
Circulation	3.23^{E}-08** (9.82^{E}-09)	3.28^{E}-08** (9.86^{E}-09)	3.38^{E}-08** (9.32^{E}-09)	3.45^{E}-08** (9.30^{E}-09)
Ln(Circ)	-.027 (.017)	-.029 (.017)	-.046** (.017)	-.048** (.017)
Available	-.011** (.005)	-.010** (.005)	-.008 (.005)	-.0075 (.0047)
Number of issues	-.005** (.001)	-.005** (.001)	-.005** (.001)	-.004** (.001)
Number of issues :interaction	.0022 (.0012)	.002 (.001)	.002** (.001)	.002** (.001)
Intro offer	-.205** (.042)	-.203** (.042)	-.192** (.040)	-.190** (.040)
Ad rate	-.216 (.116)	-.212 (.116)	-.259** (.110)	-.251** (.109)
Pride	.015** (.008)	……	.016** (.008)	…..
FutureGain	…..	.0073 (.0049)	……	.012** (.005)
% female reader	…..	…..	.205** (.041)	.219** (.042)
Median income	…..	…..	2.53E-07 (5.10E-07)	2.25^{E}-07 (5.08^{E}-07)
Constant	1.10** (.226)	1.10** (.232)	1.19** (.233)	.553** (.062)
No. observations/ Adj R^2	194/.222	194/.215	194/.308	194/.312

** indicates significance at the .05 level or better
Standard errors in parentheses.

Table 4b: Correlations between income, subratio, and ratings

	Subratio	Pride	FutureGain	Expert
Income	.084 p=.238	.434 p=.000	.387 p=.000	.212 p=.003

Table 5: Testing for Gender Differences in Commitment Behavior

Dependent Variable: One year subscription rate/ (newsstand price*number of annual issues)

Variable	(1)	(2)
Circulation	3.33^{E}-08**	3.48E-08**
	(9.46E-09)	(9.48^{E}-09)
Ln(Circ)	-.037**	-.042**
	(.016)	(.016)
Available	-.011**	-.010**
	(.004)	(.005)
Number of issues	-.005**	-.005**
	(.001)	(.001)
Number of issues:interaction	.0017	.0017
	(.0011)	(.0011)
Intro offer	-.181**	-.184**
	(.041)	(.041)
Ad rate	-.200	-.193
	(.112)	(.112)
Pride	.055**	….
	(.015)	
FutureGain	….	.031**
		(.009)
Percent female reader	.318**	.455**
	(.069)	(.128)
Female*Pride	-.076**	…..
	(.028)	
Female*FutureGain	….	-.043**
		(.019)
Constant	1.05**	1.00**
	(.213)	(.220)
No. Obs/ Adj. R^2	210/.282	210/.278

** indicates signficance at the .05 level or better
Standard errors in parentheses.