PRICING WITH MONITORING COSTS

STEVEN COISSARD* (IDRAC BUSINESS SCHOOL AND UNIVERSITE GRENOBLE 2) AND
CARLOS SEIGLIE** (RUTGERS UNIVERSITY)

ABSTRACT:
This paper presents empirical evidence which at first glance appears to show that firms are not pricing to maximize profits. We then present a model to explain how this behavior is in fact optimal when we account for additional constraints faced by firms in certain product markets.

JEL CLASSIFICATION: D21, L21.

KEYWORDS: price discrimination, monitoring costs, pricing anomaly.

* Ecole supérieure de commerce IDRAC, 47, rue Sergent M. Berthet – CP 607, 69258 Lyon Cedex 09
   Tel : 04 72 85 72 05, Email: steven.coissard@idraclyon.com. Chercheur associé, Université Grenoble 2. We are grateful to Douglas Coate, Jacques Fontanel, David Goldbaum and Alvaro Rodriguez Rosen for their helpful comments.

** Department of Economics, Rutgers University, Newark, NJ 07102, Tel : (973) 353-5914, Fax : (201) 592-8441, Email: seiglie@andromeda.rutgers.edu
INTRODUCTION

Economic research has generated a large stock of models intended to explain firms’ pricing behavior. The rate of increase has been all the more phenomenal in recent years with the help of refinements in noncooperative game theory. Any current undergraduate textbook in microeconomics will dedicate several chapters to explaining how a firm prices when operating in different market structures and will include a substantial review of the price discrimination literature. The typical student leaves the course with a set of marginal conditions that presumably have some application if they were to be given the responsibility of maximizing the profits of a firm. For example, the student-businessperson confronted with different demands for a variety of his products will know to set prices inversely with the elasticity of demand of the user.

It is therefore perplexing to observe and explain the non-events, i.e., the cases where there appears to be room for a firm to increase profits by altering its price structure and instead, we tend to observe it setting the prices of different products uniformly. We are not referring to the possible existence of price rigidity over time explained by menu cost nor to the possibility to price discriminate between different users of a given product. Instead, the problem entails explaining the uniformity in the prices of different products within a firm when there appears to exist the opportunity to raise profits by pricing differently. The puzzle is all the more challenging in light of the recent appearance of several articles in the popular press questioning the usefulness of economics in understanding real world problems (see for example, The New Yorker, The New York Times).

Let us give some examples of what appears to be anomalous pricing behavior. The pricing of hardcover books tends to show a relationship that seems to conform to what the price discrimination literature predicts, i.e., best-selling books tend to sell at higher prices. But when we look at the paperback market, both best-selling books and poorer-selling ones seem to be priced almost the same. In the recording industry, the album of a superstar artist like Madonna sells for the same price as that of less well-known and less popular artists. The football team, the New York Giants, like many other teams in the National Football League (NFL), have over a 15 year waiting list for season tickets, and for basketball’s New York Knicks the waiting list for tickets in the lower sections of Madison Square Garden where they play is also over a decade. Yet, the differential in prices between different sections of the stadium or arena is not that large. Historically, 45 RPM records all tended to be priced the same regardless of the artist (Hamlen, 1994). Finally, when individuals go to a multiplex theater they are confronted with the ability to purchase tickets for every movie at the same price, whether the movie they desire to see is starring the hottest star in Hollywood and is a hit or whether it is a flop.

In all these cases, standard economic theory predicts that profit-maximizing firms should offer a price structure that varies with the elasticity of demand if marginal costs are equalized. More elaborate models such as Oi (1971), Rosen and Mussa (1978), Rosen and Rosenfield, (1997), Stockey (1979) and Locay and Rodriguez (1992), amongst many others establish similar non-uniform pricing rules. Yet, there
are many examples where price uniformity is observed. Therefore, is the assumption of profit maximization inconsistent with this observed behavior?

Recently, Becker (1991) has proposed that social factors may be at work in understanding some anomalous behavior. Yet if we are to introduce social factors successfully, then we must be able to determine the reasons why such factors occupy more prominence in some product and service markets than in others, as well as their tendency to disappear in some systematic fashion. Therefore, this note should be viewed as offering other possible economic factors that may explain some of these real world observations that seem to be at first-hand inconsistent with economic theory. The next section presents data on various products whose prices seem to exhibit this anomalous pattern and an explanation for it is provided in Section II. Section III analyzes what appears to be a very prevalent and stark example of uniform pricing: all movie prices in multiplex cinema are equal. The final sections present some further empirical observations and conclusions.

1. Uniformity in Price: Are Firms Not Profit Maximizers?

To motivate the problem, Table 1 presents prices gathered from Publishers Weekly of best-selling mass market and best-selling hardcover books during the months of April and May 1995. In the case of mass-market paperbacks, the average price was $6.73 with a standard deviation of $0.46. Computing the coefficient of variation for prices yields 6.8 percent. In contrast, the average price for best-selling hardcover books during the same period of $21.22, with a standard deviation of $4.52 and therefore a coefficient of variation of 21.3 percent. Therefore, when books are released there is a greater degree of price discrimination, yet later on when released as paperbacks, price uniformity seems to hold. Since the volume of sales of paperback books is substantially higher than that of hardcover books, it is interesting to find that there is a greater tendency towards uniformity in price in the market with higher demand. Later it will be argued that resale opportunities and the timing of release dates for mass-market paperbacks and other commodities dampens the ability to price discriminate in these markets.

Table 2 presents the quarterly prices of CD’s and other summary statistics of the market. Looking at Billboard Magazine’s top 100 selling records for October 1995, we find the mean price for CDs at $15.66 with a variance of $1.47 or a standard deviation of $1.21. Within this group, if we partition the top 50 best-selling CDs and the bottom fifty, i.e., numbers 51-100, we find a similar paradox relating pricing to sales. For the top 50, the average price is $15.49 and with a standard deviation of $1.56. For the bottom fifty, we find the average price to be $15.84 for this month and a standard deviation of prices of 0.66. The average price of recordings in highest demand are slightly lower than those that are not as highly demanded, although the t-statistics for the null hypothesis that the prices are equal or uniform cannot be rejected. Therefore, we may conclude that they are uniformly priced. The coefficient of variation for the top 100 CDs is only 7.7.

Looking at the data for the next quarter in the month of January reveals that the mean and the standard deviation for the top 50 are $15.55 and $1.56 and the bottom 50 are $15.57 and $1.77, respectively. The t-statistics for the hypotheses that price
are equal is 0.65 which again fails to reject the hypothesis that prices are uniform. The average price, standard deviation and coefficient of variation for the top 100 are $15.46, $1.66 and 10.7, respectively. Similar results hold if we look at other quarters. For example, in April the average price for the top 50 and bottom fifty were $15.17 and $15.01, with corresponding standard deviations of $1.73 and $1.94. The t-statistics in none of the quarters can reject the null hypothesis that record stores set equal prices for records with varying demands, i.e., there is a strong tendency to price uniformly. If the marginal costs of producing CDs are equal, and there is no evidence to suggest otherwise, then to observe uniformity in price requires that the elasticity of demand for all CDs be equal. This seems to be a strong assumption to impose to justify such pricing behavior.

2. The Role of Monitoring and Enforcement Costs

With the advent of multiplex theaters all over the world, a person can purchase a ticket to see one of many films being shown in different theaters or screens. Yet, although the prices for movie tickets may vary from theater to theater and at different times during the day in a particular theater, the cost of purchasing a ticket to see the hottest movie is the same as that for a poorly attended or reviewed film. Since this offers a very stark example of uniform pricing for what appears to be different, although possibly closely substitutable goods, we will motivate the discussion based on this example also used by Cheung (1974) and more recently by Rosen and Rosenfield (1997). Note that for uniform pricing to be a profit maximizing strategy on the part of theaters it requires that the elasticity of demand for all films be equal (assuming marginal cost are equalized) or that marginal cost vary inversely with the elasticity of demand in a very systematic way.

Suppose we denote the demand for movie i by $D_i = D_i(p_i, \bar{p})$ where $p_i$ is the price of movie i and $\bar{p}$ is a vector of other movie prices. Assume for simplicity that marginal cost is constant at $c$. The problem with pricing movies is that with multiplex theaters and no monitoring of customers, if each movie was priced differently then an individual could purchase a ticket for the lowest priced movie and attend the showing of a more expensively priced and desirable one. Similar possibilities are offered in sporting events, theatrical production and concerts but the approach used to deal with the problem is to assign or number the seats. This is less costly to accomplish in these cases because there is only one performance a day for these events. To enforce price discrimination, a movie theater would have to incur some cost related to monitoring those individuals purchasing the cheaper tickets. An analogous situation occurs with our earlier example of books and CDs, in that a person can purchase a book and read it and then sell it to those who value it somewhat lower than they did. In that case, if the price differential of books varied widely, the incentive would exist for an individual to photocopy the book and sell it. The record industry also offers the possibility for individuals to purchase recordings and reproduce them or record radio transmissions and sell these pirated versions. As discussed, to avoid incurring some cost such as enforcing copyright laws or in order to make the reselling of durable products unprofitable, a firm will tend to price uniformly. In the case of multiplex theaters, resale opportunities can be reduced by uniform pricing and avoiding what will be called monitoring cost.
Let us now graphically examine the case where there are two movies and assume for simplicity that the demand for a movie is independent of the other’s price. Denote the demand and the marginal revenue curves for movies 1 and 2 as $D_1$, $D_2$ and $MR_1$, $MR_2$, respectively. Assume that marginal cost is constant and that there is a capacity constraint for each of the movie theaters or screens. Figure 1 depicts the initial equilibrium if no monitoring cost had to be incurred. As can be seen, profit maximization dictates that the theater charge a price for movie 1 of $p_1$ and that movie 2 is priced at $p_2$, i.e., that price discrimination should exist. Yet, accounting for the incentive individuals have to purchase a ticket for the lower priced movie and then to crossover to view movie 1, this pricing scheme is not sustainable. Note that we assume demand for movie 1 is such that the theater is filled to capacity and have assumed for simplicity that the demands are independent. Therefore, the owner has to begin to monitor those purchasing the lower priced ticket and making sure that they attend that particular movie. This increase in monitoring cost, $m_2$ is shown by the new marginal cost curve up to the capacity constraint, $c+m_2$. The price for movie 2 rises to $p'_2$ and therefore the gap narrows. We can see that with sufficiently high monitoring cost the theaters may decide to price uniformly.

If theaters decide to price uniformly, it will be optimal for them to have theaters of different sizes and assign less popular films to screens with lower seating capacity while reserving the larger screens for the movies in greatest demand. Yet as shown in Figure 2, even if there is no uncertainty regarding a film’s success or failure and there are multiple screening capacities, an optimal assignment of films based on size will still not dictate that movie prices should be equalized. In fact, as the following example shows, uniformly pricing movies leads to a social welfare loss in that small budget movies, even if they eventually turn out to be a success, will initially not be shown by multiplex theaters. Instead, these movies will tend to be shown in smaller theaters with only one screen and therefore, the price of admission will correspond to the marginal cost of the movie since in this case there is no need to monitor ticket sales.

Assume that a theater has two different screens with different seating capacities and it has to choose between showing three movies. As Figure 2 shows, if the theater charges a uniform price of $\bar{p}$, movie 3 will not be shown and results in a corresponding welfare loss given by area A, the area above the marginal cost curve. Movie 2 will be shown in the smaller theater, yet there is still an excess capacity given by $(s_2 - x_2)$, while movie 1 is shown on screen 1 and no excess capacity exists. Instead, if the multiplex theater price-discriminated, then it is quite possible that profit maximization would dictate that the third movie be shown over movie 2, although with a smaller audience. It should be noted that even if we allow for a continuum of screens and demands, an optimal assignment of demands to capacities would still not dictate that uniform pricing is an optimal strategy. As discussed later, when the theater decides not to price discriminate, the distributors of the film can take advantage of this and discriminate by postponing the release date of the video version of more popular movies and price them higher than that of less popular films.
The problem can be restated algebraically as follows. Let us assume for simplicity that a multiplex cinema has the capacity to show two movies, denoted by 1 and 2. Individuals’ valuation for each movie are denoted by $v_1$ and $v_2$ and are assumed to be uniformly distributed along the intervals $[0,b_1]$ and $[0,b_2]$, respectively. We assume that $b_1 > b_2$, i.e., the average demand for movie 1 is greater than for movie 2. We also assume that the valuations for each movie are independent. More specifically, there is a group who values the first movie, but not the second and vice versa. Given prices $p_1$ and $p_2$ set by the cinema, a consumer chooses to go to movie i if $v_i \geq p_i$.

In order to explore how pricing decisions are affected by monitoring cost and the degree of dishonesty or misrepresentation of preferences, let me begin by analyzing and comparing the firm’s profits under various pricing scenarios. Suppose that all costs with the exception of monitoring movie patrons are equal to zero. Making them dependent on the number of customers served does not alter the conclusions. First, we derive the optimal pricing strategies when there is perfect and costless monitoring on the part of the theater. In this case

$$\pi = p_1 \text{Prob}(v_1 \geq p_1) b_1 + p_2 \text{Prob}(v_2 \geq p_2) b_2$$

Maximization of profits given by equation (1) yields that

$$p_1^* = \frac{b_1}{2}, \quad p_2^* = \frac{b_2}{2}, \quad \text{where} \quad p_1^* > p_2^* \quad \text{since} \quad b_1 > b_2.$$  

(2)

Profit maximization dictates that prices be set at average demand and since they are different so will be prices, with consumers of the more highly demanded movie paying a higher price. The firm’s equilibrium profits are:

$$\pi = \left( \frac{b_1}{2} \right)^2 + \left( \frac{b_2}{2} \right)^2.$$  

(3)

Suppose that when firms choose $p_1 > p_2$ there is the possibility that some fraction, $\Phi$, of customers purchasing tickets for movie 2 will instead go and view the higher priced movie. The extent or pervasiveness of dishonesty in the population is assumed to be an increasing function of the price differential, which measures the monetary loss to an individual of being honest. More specifically, $\Phi = \Phi(p_1 - p_2)$ with $\Phi' > 0$. For simplicity, let the proportion of individuals who are dishonest be a linear function of the price differential, $\Phi = \phi(p_1 - p_2)$ where the parameter $\phi$ is positive. Assuming that monitoring cost are proportional by $m$ to this fraction that are dishonest, then profits in this case are
The first term in total revenue captures the sale to those customers who are honest and purchase tickets for the more expensive movie, while the second represents the revenue derived from the fraction of those who want to see movie 1 and instead purchase the lower priced movie 2. The third term is the revenue derived from the fraction of dishonest individuals who value movie 1 below its price but above that of movie 2’s, and therefore pose as movie 2 goers but instead view movie 1. The fourth term captures those who reveal to prefer movie 2 and therefore, purchase tickets for this movie. If the theater could separate the different demanders, they would only have to monitor those individuals purchasing the lower priced tickets since it would be irrational on the part of someone to pay more for a particular movie to then sneak into a cheaper one. Yet, given it is not costless to do so, the final term indicates that cost is proportional to the total number of patrons entering the movie theater, with the factor of proportionality being the extent of dishonesty.

The first term in total revenue captures the sale to those customers who are honest and purchase tickets for the more expensive movie, while the second represents the revenue derived from the fraction of those who want to see movie 1 and instead purchase the lower priced movie 2. The third term is the revenue derived from the fraction of dishonest individuals who value movie 1 below its price but above that of movie 2’s, and therefore pose as movie 2 goers but instead view movie 1. The fourth term captures those who reveal to prefer movie 2 and therefore, purchase tickets for this movie. If the theater could separate the different demanders, they would only have to monitor those individuals purchasing the lower priced tickets since it would be irrational on the part of someone to pay more for a particular movie to then sneak into a cheaper one. Yet, given it is not costless to do so, the final term indicates that cost is proportional to the total number of patrons entering the movie theater, with the factor of proportionality being the extent of dishonesty.

Maximization of equation (4) yields that

\[
p_1 = \frac{1 - (m \phi)^2 + m \phi - \phi^2 - 2m \phi^2}{2[(1 - \phi)(\phi + 2m \phi + 1) - (m \phi)^2]} b_1 - \left[m \phi \right] b_2, \tag{5}
\]

\[
p_2 = \frac{\phi(1 - \phi) + 2m \phi (1 - \phi) - (m \phi)^2}{2[(1 - \phi)(\phi + 2m \phi + 1) - (m \phi)^2]} b_1 + \left[m \phi - (m \phi)^2 + 1 \right] b_2. \tag{5'}
\]

Note that if \( \phi = 0 \), i.e., everyone is honest than prices are equal to those when perfect monitoring exists given by equation (2), namely \( p_1 = b_1 / 2 \) and \( p_2 = b_2 / 2 \).

Suppose that \( \phi > 0 \), i.e., there are some individuals who will purchase the lower priced movie ticket to view the more expensive one. As monitoring cost rise for the theater, the profit maximizing prices will tend to be equalized. More specifically,
Therefore, the presence of high monitoring cost and some possibility for misrepresentation of type (more generally, reselling of the product) will lead to uniform pricing being the profit maximizing pricing strategy.\footnote{Another way to view the problem is as a signaling game. Since the cost of signaling for the honest and dishonest types are the same, the optimal pricing strategy for the movie theater is a pooling equilibrium strategy, i.e., to set the same prices for those who prefer to see movie 1 (honest and dishonest) and those preferring movie 2.}

Yet this pricing strategy is not necessarily socially optimal as was previously shown graphically. As the limiting case shows, since $b_1 > b_2$ individuals who value movie 2 are priced out of the market. More generally, this helps explain why movies with small followings (low $b$’s) tend to be shown in small, generally single screen theaters and not in the multiplex theaters.

Finally, the model can be extended to include two other factors that will tend to create pressure for firms to price uniformly. The first is that risk-averse consumers may prefer stability in price to variability. The second factor is that if theaters face an uncertain demand for films, there is an additional benefit from establishing uniform prices. The reason is that it is easier to assign movies to screening capacity when prices are uniform, than when prices are first set, and based on the responsiveness of consumers to these different prices, the screens are assigned.

3. **Some Further Observations: An Example of Discrimination in Release Date and Price from the Video Market**

A vertically integrated movie industry which finds that upstream firms are forced to uniformly price may find it optimal to intertemporally discriminate by pricing the movie videos differently, or delaying the release time of the video version so as to increase the demand at the movie theaters (see Rosen and Rosenfield, 1997 for a discussion of the intertemporal pricing of theater seat). This phenomenon may also occur in the publishing industry when the introduction of the paperback version of a book is a variable or in the record industry, when the timing of the release of singles and the record album of an artist is important.

Therefore, the price of a product such as movie videos will be a function of the demand for the underlying film and the amount of time since the movie was last playing in the theaters. Presumably, the more popular a film is the greater will be the demand for it when it comes out in video format. Therefore, we would expect video prices to be positively related to the popularity of the movie in theaters. In addition, the price of the video version of a movie should be inversely to the amount of time since the film was out in theaters. Individuals would be willing to pay more for a video the more recent the film was being shown in theaters, i.e., allowing the cost to be an increasing function of the number of customers viewing each movie permits the limiting case to have positive numbers of patrons for each screen, with those movies with low $b$’s still not making the multiplex theaters.
there is some positive discount factor governing the consumption of the type of entertainment services provided by films. This may be that films are similar to a club good in that individuals view it partly to discuss it with others. Therefore, the further away from the date the film was last being shown in theaters the less likely someone is to find someone currently discussing the film.

To examine the relationship between these variables, we regress the length of time it takes a movie to be released on video (VideoRelease), a measure of the Box Office success or popularity of the movie (Screens) on the price of the video at the time of its release (VideoPrices). More specifically, Screens is defined as the widest point of release of a movie, i.e., the maximum number of screens which showed the movie and VideoRelease is the difference in days between the date the video is released and the opening day when it was shown in theaters. Since the video’s release date is not exogenous to the movie company, we must account for it being determined simultaneously along with the price of the video. Therefore, we also present results using Two-Stage Least Squares using the cost of making the film, (Cost), an exogenous variable once the film has been shown in theaters, as an instrumental variable.

Table 3 summarizes some statistics for these variables. Collecting the data requires obtaining video prices and release dates and then going back and obtaining data on the particular films when they were showing in theaters. Data for theatrical release dates, as well as box office totals and estimated cost were obtained from EDI and for video release dates and prices from Video Store Magazine. As shown, the mean video price is $68.30, with a standard deviation of $1.91. The average length of time between the release of a movie in theaters and on video was 189 days with a standard deviation of 45 days. As the statistics for the maximum number of screens showing the movie indicates, the sample includes both very successful films, as well as those where demand by the public led to limited showing. The average cost of producing a movie was $20 million dollars, but as the standard deviation of close to $13 million indicates the sample includes films produced at much lower cost.

The obtained results are summarized in Table 4. As these show, the results from estimation using OLS and 2SLS are consistent with our expectations and are statistically significant. For example, a delay in a video’s release date by 100 days leads to a $2.00 decrease in the video’s price. Similarly, an additional 1,000 screens showing the movie is associated with a very modest $1.00 increase in its video price.

The average and variance of video prices, along with the above results, show that videos also tend to be priced fairly uniformly. This observation is based on a sample of a wide spectrum of movies, including blockbusters and flops. In this case though, the ability to discriminate in the release date of the video appears to act as a mechanism to partly explain this finding.
CONCLUSION

Empirical evidence supports the contention that uniform pricing occurs for products that are not perfect substitutes. Partly motivated by the recent criticism of the ability of economics to provide an understanding of practical problems, this note has shown that economic factors can be used to explain quite stark anomalies in pricing behavior. In particular, it is shown that economic factors such as the opportunity to resell certain commodities and the monitoring and enforcement costs associated with the production and distribution of these products serve to shed light on observations that at first glance appear to be counter to what standard economic theory predicts. Similarly, another factor such as the release date for a different, though possibly very close substitute for a product may further accentuate uniformity in prices.

REFERENCES

APPENDICES

**TABLE 1. DATA ON BOOKS**

<table>
<thead>
<tr>
<th></th>
<th>Mass Market Paperback</th>
<th>Best Selling Hardcover Fiction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Price</td>
<td>$6.73</td>
<td>$21.22</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>$0.46</td>
<td>$4.52</td>
</tr>
<tr>
<td>Coefficient of Variation</td>
<td>6.8</td>
<td>21.3</td>
</tr>
</tbody>
</table>

*Note:* Data was obtained from Publishers Weekly, April 1995 for hardcover and May 1995 for paperback.

**TABLE 2. DATA ON CDs FOR TOP 100 ON CHART**

<table>
<thead>
<tr>
<th></th>
<th>Top 50</th>
<th>Bottom 50</th>
<th>Top 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Price (10/95)</td>
<td>$15.49</td>
<td>$15.84</td>
<td>$15.66</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>$1.56</td>
<td>$0.66</td>
<td>$1.21</td>
</tr>
<tr>
<td>t-statistic</td>
<td>1.40</td>
<td></td>
<td>7.7</td>
</tr>
<tr>
<td>Coefficient of Variation for Top 100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Price (1/96)</td>
<td>$15.35</td>
<td>$15.57</td>
<td>$15.46</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>$1.56</td>
<td>$1.77</td>
<td>$1.66</td>
</tr>
<tr>
<td>t-statistic</td>
<td>0.65</td>
<td></td>
<td>10.7</td>
</tr>
<tr>
<td>Coefficient of Variation for Top 100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Price (4/96)</td>
<td>$15.17</td>
<td>$15.01</td>
<td>$15.09</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>$1.73</td>
<td>$1.94</td>
<td>$1.83</td>
</tr>
<tr>
<td>t-statistic</td>
<td>0.43</td>
<td></td>
<td>12.1</td>
</tr>
</tbody>
</table>

*Note:* Data was obtained from Tower Records, NY. Multiple CD sets (anthologies) were excluded resulting in sample sizes of 97, 98 and 99, respectively.

**TABLE 3. DESCRIPTIVE STATISTICS**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>VideoPrices</td>
<td>$68.30</td>
<td>$1.91</td>
</tr>
<tr>
<td>VideoRelease (days)</td>
<td>189</td>
<td>45</td>
</tr>
<tr>
<td>Screens</td>
<td>1,174</td>
<td>735</td>
</tr>
<tr>
<td>Cost (in millions)</td>
<td>$20.00</td>
<td>$12.95</td>
</tr>
</tbody>
</table>

*Sources:* Video Store Magazine (various issues) and Entertainment Data, Inc.
TABLE 4. OLS AND 2SLS ESTIMATES OF REGRESSING VIDEO RELEASE AND SCREENS ON VIDEO PRICES

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>OLS Regression</th>
<th>2SLS Regression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>67.3</td>
<td>70.6</td>
</tr>
<tr>
<td></td>
<td>(57.8)</td>
<td>(60.5)</td>
</tr>
<tr>
<td>VideoRelease</td>
<td>-0.01</td>
<td>-0.02</td>
</tr>
<tr>
<td></td>
<td>(2.02)</td>
<td>(3.76)</td>
</tr>
<tr>
<td>Screens</td>
<td>0.002</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>(3.93)</td>
<td>(3.47)</td>
</tr>
<tr>
<td>Adjusted R^2</td>
<td>0.30</td>
<td>0.49</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>64</td>
<td>41</td>
</tr>
</tbody>
</table>

Notes: The t-ratios are shown in parentheses below coefficients. Instruments used include the exogenous variables and the cost of making a movie, COST.

FIGURE 1