



# Cheap Tuesdays and the demand for cinema<sup>☆</sup>

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## ARTICLE INFO

### Article history:

Received 3 May 2012

Received in revised form 28 January 2014

Accepted 11 February 2014

Available online 20 February 2014

### JEL classification:

L13

L82

### Keywords:

Motion pictures

Cinema demand

Discrete choice model

Market expansion

## ABSTRACT

Many movie markets are characterised by extensive uniform pricing practices, hampering the ability to estimate price elasticities of demand. Australia presents a rare exception, with most cinemas offering cheap Tuesday ticket prices. We exploit this feature to estimate a random coefficients discrete choice model of demand for the Sydney region in 2007. We harness an extensive set of film, cinema, and time-dependent characteristics to build a rich demand system. Our results are consistent with a market expansion effect from the practice of discounted Tuesday tickets, and suggest that cinemas could profit from price dispersion by discounts based on observable characteristics.

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“One of the more perplexing examples of the triumph of convention over rationality is movie theatres, where it costs you as much to see a total dog that’s limping its way through its last week of release as it does to see a hugely popular film on opening night.”

[James Surowiecki (*The Wisdom of Crowds*, 2004, p.99)]

<sup>☆</sup> We would like to thank the editor, Julie Holland-Mortimer, and two anonymous referees for valuable comments. We would also like to thank Phillip Leslie, Kathryn Graddy, Darlene Chisholm and David Prentice for comments on earlier drafts of this paper. We are grateful for the research assistance of Akshay Shanker and Paul Tiffen. We are also grateful to participants at the Screen Economics Research Group Symposium (Sydney, June 2009), European Science Days Summer School (Steyr, July 2009), Australian Conference of Economists (Adelaide, September 2009), Macquarie University (Sydney, February 2010), International Conference on Cultural Economics (Copenhagen, June 2010), Suffolk University (Boston, October 2010), Mallen/UCLA Scholars and Practitioners Workshop in Motion Picture Industry Studies (Los Angeles, November 2010), University of Tasmania (Hobart, February, 2011), University of Western Australia (Perth, May 2011), Conference of the European Association for Research in Industrial Organization (Stockholm, September 2011), and University of Melbourne (Melbourne, October 2012). Finally, we would like to thank the Motion Picture Distributors Association of Australia and Rentrak Australia (formerly Nielsen EDI) for supplying the data used in this study, and Paul Aubrey from Greater Union Cinemas for the useful comments and insights.

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## 1. Introduction

Product differentiation in movies is self-evident to even the most casual enthusiast. However, as [Orbach and Einav \(2007\)](#) discuss in detail, to the puzzlement of many observers, the practice of (almost) uniform pricing is a long-standing feature of the market for movies screened in cinemas.<sup>1</sup> The Australian cinema market offers a rare partial exception. For example, in Sydney almost all cinemas offer discounted tickets every Tuesday for the entire day.<sup>2</sup> Based on typical multiplex prices, this reduces the price of an adult ticket by about 40%, a student ticket by about 25%, and a child ticket by about 20%. We exploit this rare (and arguably exogenous) price variation in the Sydney cinema market to estimate the demand for cinema using a comprehensive data set of daily film revenues for cinemas in the greater Sydney region over the year 2007.

Our first goal is to investigate whether this experiment with discounting has been successful. Has it led to an increase in cinema

<sup>1</sup> [Orbach and Einav \(2007\)](#) provide detail that during the pre-Paramount era (i.e. before 1948) variable pricing strategies were used with respect to films categorised by quality. This practice subsequently continued into the 1950s and 1960s where ‘event’ movies were often priced above other movies. Price variation between weekends and weekdays and by type of seat within an auditorium was also evident. This kind of price variation has more recently been largely absent in most markets. [Orbach and Einav \(2007\)](#) conclude that exhibitors could increase profits if they practiced variable pricing strategies.

<sup>2</sup> In the U.S. on certain days matinee performances may be priced lower, but not the evening sessions where there is likely to be more demand.

attendance, or has it simply induced consumers to switch the timing of their attendance? The purpose of discounted pricing is typically to lure consumers into the market and away from competitors. In the case of the Sydney cinema market, discounting is quite well coordinated across cinemas with almost all cinemas engaging in “cheap Tuesday” pricing. In aggregate then, cinemas are likely to benefit only if discounting leads to a market expansion.

To tackle this problem, we consider two alternative market definitions in our demand specification. Our daily market definition includes all films exhibited on a specific day in the choice set of each consumer. An outside good is also available, permitting consumers to opt out of the movie market. Discounting can then lead to substitution away from the outside good or other movies offered on the same day, but not substitution away from movies on other days of the week. By not allowing such temporal substitution, this definition could overstate the market expansion due to cheap Tuesday pricing. Our weekly market definition is designed to address this problem by including all films screening over the week within the choice set of each consumer.<sup>3</sup> Using this definition, we can examine whether discounting has led to substitution away from the outside good or substitution away from other films offered during the week.

Our second goal is to examine the potential profitability of additional price dispersion. Despite weekly discounting, a remarkable degree of price uniformity remains in the Sydney market. In particular, we observe the two pricing puzzles discussed by *Orbach and Einav (2007)*: i) the ‘movie puzzle’ (why different movies attract the same price); and ii) the ‘show-time puzzle’ (why different times, days, and seasons are priced uniformly). Armed with our demand estimates, we simulate optimal pricing for different types of films, ranging from a film in the middle of its run to an opening week film to a blockbuster in opening week. This allows us to examine the returns to price adjustments for different categories of films.

Price uniformity itself hampers attempts to formulate an optimal pricing strategy. Without variation in price, demand elasticities cannot be inferred from the data, and the enterprise is destined for failure. An additional contribution of our work is then to obtain demand estimates in a setting with substantial price variation. We observe prices that vary by around 30% in every week of the sample for each cinema–film pair. We also make use of a rich data set, enabling us to estimate a detailed characteristics-based demand system. In particular, we control for film characteristics (e.g. genre, budget, advertising, reviews, cast appeal), theatre characteristics (e.g. location, number of screens), the day of observation (e.g. day of week, public/school holidays, weather), and the demographics of the local population (e.g. age, income).

We adopt a random coefficients discrete choice model of demand. We define a product as a combination of a film, a theatre and day of screening. There are a large number of such products in our sample, making a characteristic-based estimation strategy the only feasible means of extracting the full set of cross-price elasticities. To accommodate heterogeneous preferences for movie offerings, our strategy is based on the empirical model of *Berry et al. (1995)* (hereafter, “BLP”). Following *Nevo (2001)*, we permit heterogeneity in “observable” characteristics (local region-specific demographic characteristics) as well as “unobservable” characteristics; and we include movie-specific fixed effects. Following *Davis (2006)*, we incorporate a spatial dimension to product characteristics that accounts for travel costs. In the spirit of *Imbens and Lancaster (1994)* and *Petrin (2002)*, we include additional moment conditions based on external population demographic data.

Our estimation strategy relies on the assumption that the demand for movies on Tuesdays is essentially the same as for regular weekdays. That is, we assume that the choice of Tuesday (as opposed to Monday, Wednesday or Thursday) as the cheap ticket day is not related to demand

conditions.<sup>4</sup> Under this assumption, an indicator variable for Tuesdays represents a valid instrument for prices.<sup>5</sup> Moreover, it is an important instrument, accounting for much of the variation in prices. We note that we are unable to explicitly test this assumption. Because the vast majority of weekly price variation is due to Tuesday discounts, we are unable to separately identify variation in attendance on Tuesdays from variation in price on Tuesdays. However, we have no reason to suspect demand differs systematically between Mondays, Tuesdays, Wednesdays, and Thursdays. A consequence of this choice of instrument is that much of the identification of the price elasticity of demand stems from temporal variation in prices as opposed to cross-sectional variation.

The profit maximisation problem of a cinema is a complicated one. In particular, we see the consideration of ancillary sales to be an important issue. We are not armed with data to rigorously tackle this problem.<sup>6</sup> Accordingly, we do not introduce supply side moment conditions, but rely only on our demand model to estimate demand parameters. Instead, given our estimated demand parameters, we consider the cinema’s revenue maximisation problem in the absence of concerns about ancillary sales. Given the likely positive relationship between cinema attendance and concession sales, we argue that this places an upper bound on the cinema’s profit-maximising prices.

As in most applied settings, our data constrain the performance of our estimation strategy. In particular, we rely on repeated observations of a single (large) geographic market. This provides cross-sectional variation between connected local markets, but not between geographically separated markets. Our data exhibit intra-week temporal variation in price, but no other systematic time-series price variation; and cinemas charge the same price for all movies screened on a given day. Hence, it is intra-week temporal variation in price coupled with cross-sectional variation at the level of a cinema (rather than a film) that identifies our demand estimates. Further, films tend to be introduced simultaneously across multiple cinemas, constraining our ability to identify heterogeneity in preferences for films. We return to these issues in the discussion of our results.

To preview our results, consistently across the set of specifications we consider, we observe that: cinema demand is relatively elastic, with the median own-price elasticity of a film-at-theatre around 2.5 or higher; cross-price elasticities are quite low, leading us to believe that much substitution takes place with the outside good; and there are intuitive relationships between cinema attendance and a range of film-, cinema-, and time-specific characteristics. Both our daily and weekly models suggest that the effect of discounting has been not only a market expansion, but also an increase in revenue.

Finally, our revenue-maximisation problem is consistent with systematic overpricing for a substantial subset of cinema tickets. For a typical film in our dataset, our demand estimates suggest that a price reduction would raise revenue without stretching screening capacity. However, for a subset of films (such as opening week films with wide release), it is plausible that screening capacity could be constrained in the presence of substantial discounting.<sup>7</sup>

<sup>4</sup> Our correspondence with industry participants has not yielded a conclusive explanation for the emergence of “Cheap Tuesdays”. However, the propensity for public holidays to fall on Mondays and new movies to be released on Thursdays suggests a narrowing down of the available days for an off-peak discount that is unrelated to demand (once we control for public holidays and opening days).

<sup>5</sup> In fact, in estimation we include a ‘cheap day’ dummy variable as four independent cinemas actually offer a cheap Monday ticket and one cinema offers a cheap Thursday ticket in our sample. Further details are provided in Section 4.

<sup>6</sup> By contrast, *Davis (2006)* and *Moul (2008)* attempt to overcome this problem by imposing assumptions about the relationship between these variables based on aggregate industry data.

<sup>7</sup> It is worth noting that we perform a demand estimation exercise rather than a forecasting exercise. Cinema managers are likely to have additional information at their disposal – such as film- and session-specific attendance information as it develops. If our demand study reveals opportunities to profitably vary price based on observable information, a forecasting exercise could be even more revealing. However, an important complicating factor is the role of word-of-mouth.

<sup>3</sup> We thank Philip Leslie for suggesting this alternative market definition.

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