

# Firms & Markets

# Wednesdays at Cinemex

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Nive Venkat

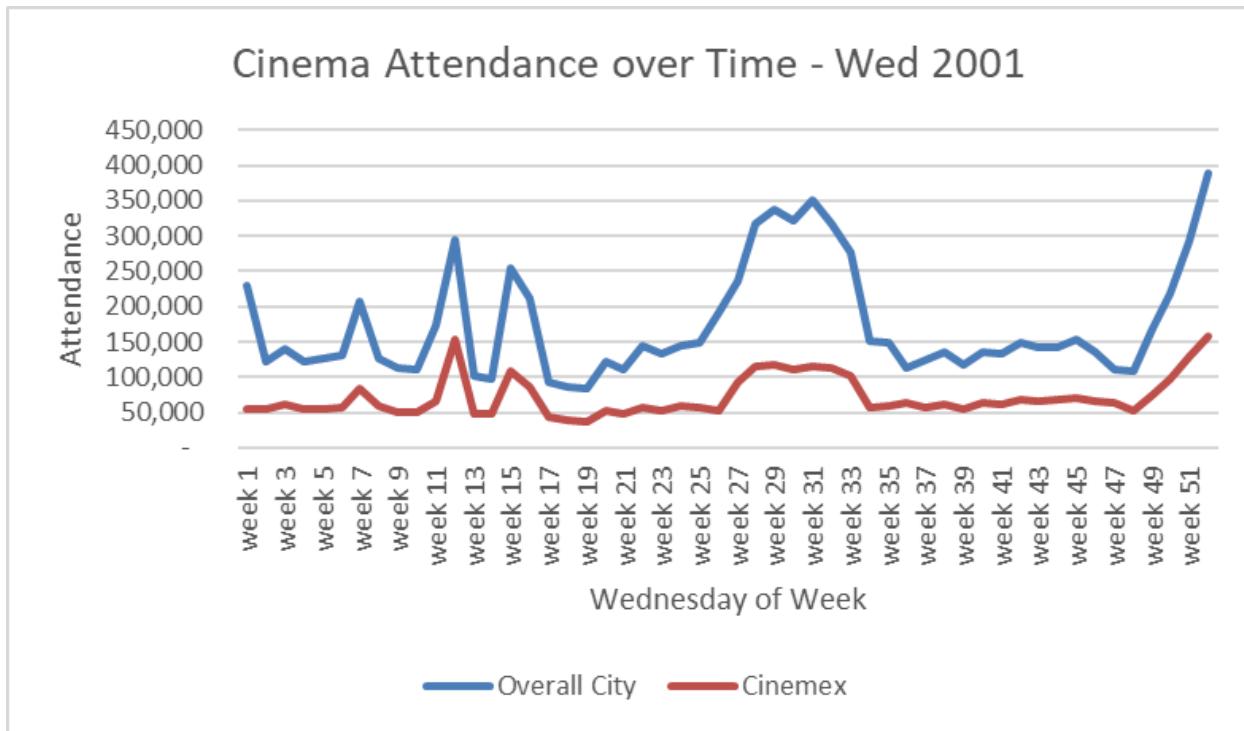
S.I. Newhouse

Samantha Frangos

Lauren Díaz Morgan

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A) Graph the time series of attendance and prices for each Wednesday in 2001. What factors do you think account for the week-on-week differences in attendance for Cinemex and the city as a whole? What is the interpretation in terms of a demand curve (illustrate with a diagram and talk me through what the diagram represents)?



a) Cinema attendance in Mexico City on Wednesdays for the year of 2001.

Note: Week 12 in 2001 and Week 18 in 2002 were holidays and were not eligible for the 2-for-1 deal.

Observations from graph:

1. The peaks in attendance correspond to weeks 12 and 18, coinciding with holiday periods. Moreover, weeks 27 to 33 also exhibit increased attendance compared to other times of the year, spanning from July to early August. This surge aligns with the typical closure of schools for summer holidays, indicating a higher influx of visitors to the theater during these weeks.
2. The time series plot shows a similar trend for both Cinemex and the city, suggesting that the attendance patterns at Cinemex align with the overall attendance patterns in the city.

Factors that might affect week-over-week attendance :

1. Seasonal demand based on holidays.
2. Movie release dates - typically more movies are released during the summer and the Christmas holiday seasons.
3. Popularity of the movies playing in a particular season would also affect demand/attendance
4. Weather conditions – e.g. a heat wave may drive more people to the air-conditioned movie theater

5. During the first week, we are likely to see higher attendance compared to the last week, as salaries are typically debited then, encouraging more spending on leisure activities like watching movies at the theater.

Factors that might cause the demand curve to shift right (increased demand):

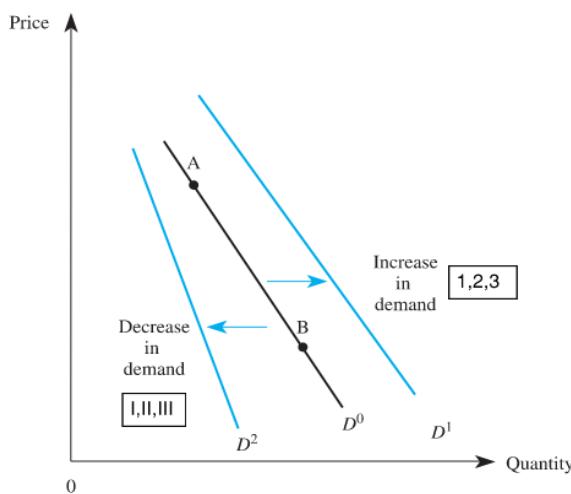
1. Holidays: People are more likely to attend the cinema during periods of leisure, or when schools are closed.
2. Heat Waves: Especially hot weather may drive more people to the air-conditioned movie theater.
3. Early in the Month: During the first week of the month, we may see higher attendance as salaries are typically paid out then, encouraging more spending on leisure activities such as going to the movie theater.

Factors that might cause the demand curve to shift left (decreased demand):

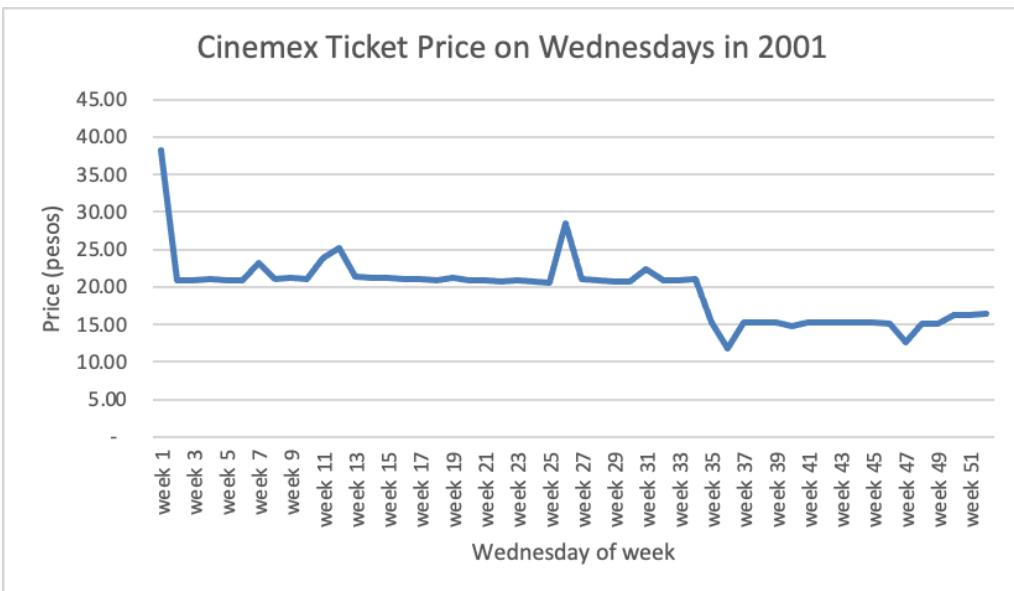
- I. Unpopular Movies: If no popular movies are playing, it is less likely that people will choose to go to the cinema.
- II. Favorable Weather: When the weather outside is temperate and pleasant, people may prefer to spend time outdoors rather than going to the movies.
- III. Late in the Month: In the last week of the month, people may have already spent their budget on other activities and be living more frugally until they receive their next paycheck at the beginning of the following month.

If we look at image b) below, If  $D_0$  is the typical demand curve for movie tickets in Mexico City, we would expect that during holidays, heat waves, or early in the month, the curve would shift to the right –  $D_1$  – meaning that more tickets would be demanded at any price.

When there are no popular movies out, when the weather outside is temperate and pleasant, or when it's late in the month, we would expect the demand curve to shift to the left –  $D_2$  – meaning that fewer tickets would be demanded at any price.



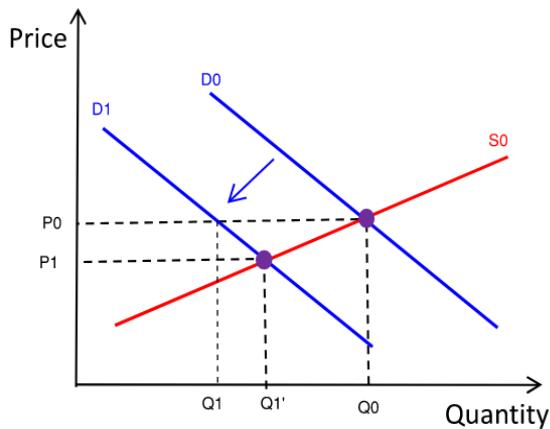
b) *The demand curve shifts as a result of Factors 1,2,3 and I,II,III*



c) *Cinemex ticket Prices on Wednesdays in 2001*

B) In Spring 2001, Cinemex's main competitor introduced 2-for-1 pricing. Describe, in conceptual terms (and using a demand diagram), the effect this had on Cinemex's demand curve. In the same diagram, show the effect of Cinemex's price response. Again, interpret your diagram in words.

We know that, as per the law of demand, when the price of goods rises, with all other factors remaining constant, the quantity demanded decreases. With this principle in mind, the introduction of 2-for-1 tickets on Wednesdays by a competitor will inevitably impact Cinemex's demand curve. Since the competitors and Cinemex are substitutes, a decrease in the price of one good leads to a reduction in demand for the other. Therefore, when the competitor lowers ticket prices on Wednesdays through the introduction of the 2-for-1 policy, it stimulates increased demand for their tickets (resulting in heightened attendance at their movie theaters during this period). Consequently, Cinemex tickets would be less in demand, and Cinemex attendance would drop. This change is represented by a leftward shift of Cinemex's demand curve.



d) *Shift in Demand as a result of change in price.*

When the demand curve shifts leftward, it signals a decrease in the quantity demanded at the current price. Using the graph above as an illustration, D<sub>0</sub> represents Cinemex's demand curve prior to their competitor implementing 2-for-1 pricing. At that time, ticket quantity Q<sub>0</sub> was demanded at ticket price P<sub>0</sub>. However, once the competitor begins their 2-for-1 pricing, Cinemex's demand curve would shift left – represented by demand curve D<sub>1</sub> above. Due to this leftward shift of the demand curve, at the same ticket price P<sub>0</sub>, fewer tickets would be demanded than before – represented as quantity Q<sub>1</sub> above.

In the long term, this shift affects the supply of the product (in this case, ticket sales) because producers may opt to supply less at lower costs. Additionally, when the supply remains constant and demand decreases, it may result in producer surplus. In this context, it would imply an excess of unsold tickets, potentially leading to reduced revenue and profits.

When Cinemex decided to implement their own 2-for-1 pricing, that change manifested as movement along the demand curve instead of an overall shift. (Changes in external factors cause demand curves to *shift*, whereas changes in pricing manifest in movement *along* demand curves.) Using the above illustration, we could say that Cinemex's introduction of 2-for-1 pricing lowered their overall average ticket price from P<sub>0</sub> to P<sub>1</sub>, resulting in an increase in the quantity of tickets demanded from Q<sub>1</sub> to Q<sub>1'</sub>.

**C) How would you construct a counterfactual scenario for what would have happened had this 2-for-1 pricing by competitors not occurred? Explain your answer in terms of the diagram you drew in the previous question.**

Had the competitor not introduced the 2-for-1 pricing, there would have been no shift in the demand curve for Cinemex. Consequently, Cinemex's ticket demands would not have decreased, and ticket sales would have remained unaffected. Typically, a decrease in quantity demanded leads to lower revenue and profits.

Looking at the diagram in the previous question, we can say that if Cinemex's competitor had not introduced 2-for-1 pricing, Cinemex's demand curve would have remained at D<sub>0</sub> instead of shifting to D<sub>1</sub>. This means that they could have continued selling more tickets at a higher price.

In order to identify the effect on Cinemex attendance had the 2-for-1 deal not been introduced, we could construct a multi regression that includes the competitor price change as a dummy variable and therefore isolate its effect from other selected control variables.

The variables in our regression would be:

1. 2001 Price - If price decreases, we would expect demand to rise regardless of the existence of the 2-1 deal

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- 2. 2000 Cinemex Attendance - This controls for seasonality that might affect attendance
  - 3. 2001 City Attendance - This controls for overall attendance across the city
  - 4. Dummy Cinemex - This controls for Cinemex's eventual price change, which occurred while competitor 2-1 pricing was already in effect

**D) Construct this counterfactual for attendance. Discuss how you isolate the effect of the competitor's price change from the effect of all the other things pushing demand around (the stuff you discussed in part (a)). Be clear about the extent to which you are able to do this (remember no analysis of real data is ever perfect in this regard, but it is important to be able to spot the limitations of whatever methodology you do employ).**

To begin constructing this counterfactual situation for attendance, we used two methods: a regression analysis, and an analysis of the percent change in attendance.

% Change in attendance:

We can first separate the yearly calendar into three time periods:

Spring = Weeks 1-13

Summer = Weeks 14-34

Winter = Weeks 35-52

In part C, we state that had the competitors not introduced 2-for-1 pricing, Cinemex's attendance would not have fallen. In order to calculate this counter-factual, we need to isolate the effect of the competitor's 2-for-1 price change from the other effects driving supply and demand. To do this, we need to calculate two things:

- 1) The percent change in Cinemex's attendance from Spring 2000 to Spring 2001 (which compares actual year over year differences without the 2-for-1 price change).
- 2) The percent change in Cinemex attendance between Spring 2000 and Summer 2000 (which gives us the baseline seasonal percent change in attendance rate).

Referring to the chart e) below, the average percent increase in weekly attendance from Spring 2000 to Spring 2001 for Cinemex is 13%, The calculated percent change in weekly attendance from Spring 2000 to Summer 2000 is 19%.

	Cinemex Attendance											
	Week (inc Weds)						Wednesday					
Season	Avg 2000	% change between seasons	Avg 2001	% change between seasons	Avg 2002	% change between seasons	Avg 2000	% change between seasons	Avg 2001	% change between seasons	Avg 2002	% change between seasons
Spring	404968		457034		485032		51107		65103		97555	
Summer	482711	19	512107	12	537414	11	74476	46	74367	14	129615	33
Winter	379158	-21	403467	-21	420589	-22	51109	-31	74035	0	98619	-24
<b>% changes Between years</b>												
		<b>2000 to 2001</b>		<b>2001 to 2002</b>				<b>2000 to 2001</b>		<b>2001 to 2002</b>		
Spring		13		6				27		50		
Summer		6		5				0		74		
Winter		6		4				45		33		

e) Cinemex Attendance and percent changes between years 2000 - 2002

We can use the following formula to estimate the counterfactual attendance:

Cinemex Attendance in Spring 2000 x yearly effect x summer effect = what Cinemex estimated attendance would have been without the competitor's price change.

From this calculation, we can deduce that the estimated average attendance could have been 54,4561 – 6% higher than the actual average attendance for the whole week in Summer 2001 – had the competitors not introduced 2-for-1 pricing.

Multiple Regression Analysis:

Additionally by running the multiple regression analysis, we get the following results:

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.971567
R Square	0.943942
Adjusted R Square	0.937849
Standard Error	7043.325
Observations	52

ANOVA

	df	SS	MS	F	Significance F
Regression	5	3.84E+10	7.69E+09	154.9160987	1.37E-27
Residual	46	2.28E+09	49608428		
Total	51	4.07E+10			

	Coefficient	standard Err	t Stat	P-value	Lower 95%	Upper 95%	Lower 95%	Upper 95%
Intercept	71056.9	9932.56	7.153936	5.35709E-09	51063.69	91050.11	51063.69	91050.11
2000 Cinemex Attenc	-0.27646	0.076583	-3.60997	0.000753423	-0.43061	-0.12231	-0.43061	-0.12231
2001 City Attendanc	0.420946	0.020623	20.41193	1.07805E-24	0.379435	0.462457	0.379435	0.462457
2001 Price	-2452.51	412.6294	-5.94361	3.51774E-07	-3283.09	-1621.93	-3283.09	-1621.93
Dummy Competitor	-6471.91	2830.955	-2.28612	0.026901001	-12170.3	-773.489	-12170.3	-773.489
Dummy Cinemex	-7785.43	3868.043	-2.01276	0.050015039	-15571.4	0.532865	-15571.4	0.532865

Of note, the P-values for each variable show significance at 5% and all except the Dummy variables are significant at 1%. We isolated the effect of 2-1 pricing by controlling for these other factors as independent variables. The high significance in P-values for each variable indicates a high likelihood that each variable has a significant effect on Cinemex 2001 attendance. We can thus infer that the counter-factual (less change in Cinemex 2001 attendance had 2-1 pricing *not* been introduced by competitors) would hold true as well.

In terms of limitations of the multi regression:

1. There was a high correlation between 2001 Cinemex Attendance and 2001 City Attendance, which could mean that City Attendance on its own could be enough to explain the effect on Cinemex attendance.
2. The dummy for Cinemex has a negative coefficient (-7,785.43) and this is probably due to confounding factors such as seasonality and the introduction of 2-1 pricing.
3. As always, correlation is not causation. Just because the Competitor price change has a statistically significant negative coefficient does not mean it entirely explains the change in attendance.
4. Our analysis is being performed with only two years of data, making it more likely for false estimations to be made.

**E) As an aside, people occasionally try to do this using market shares. Suggest why basing this analysis solely on market share data might be problematic.**

Basing this analysis solely on market share data is problematic as it wouldn't account for cinema-specific factors that could impact revenue. For example, market share data does not account for theater capacity, which is finite and cannot scale quickly to meet demand. At periods of high demand, a given theater can't capture more of the market without increasing capacity, which would involve somehow adding more seats, or more screens or more showtimes.

Furthermore, market share may be a problematic metric for this kind of analysis because it can be greatly affected by whether or not more competitors/suppliers are entering the market. If more cinemas were to open in Mexico City, Cinemex's market share would likely drop. Analysts may be tempted to attribute such a drop to Cinemex's higher pricing, even if pricing was not the "real" reason for the loss of market share.

An additional detail that could muddle analysis is that market share isn't necessarily an indicator of success. If one cinema were to offer their tickets for an extremely low price, they may capture a large segment of the market without turning much of a profit. In that scenario, a cinema with lower market

share (offering tickets at a higher price) may be more “successful” from a business standpoint, as they would likely have higher revenue/profits.

**F) Using this counterfactual, quantify the impact of competitor’s 2-for-1 pricing on Cinemex’s Wednesday attendance? (That is, provide a number: e.g., the 2-for-1 pricing lead to attendance increasing, for a representative week, by 7,654,321 people or 53%).**

Using the same rationale, as we did in question D, we can calculate the impact that the competitor’s 2-for-1 pricing had on the average Wednesday Cinemex attendance.

We can do this by comparing the *estimated* average number of attendees that would have visited Cinemex’s theaters on Wednesdays in the summer of 2001, had the competition not reduced their prices using our percentage calculations to the actual number of average attendees on Wednesdays for Cinemex in Summer 2001.

Again, since ticket pricing was held constant by both Cinemex and the competitors from Spring 2000 To Spring 2001, and from Spring 2000 to Summer 2000, we can use these average percentages to try to eliminate the effect of the competitor price change on attendance.

From chart e) we can see that the average percent increase in Wednesday attendance from Spring 2000 (51107) to Spring 2001 (65103) for Cinemex is 27%, The calculated percent change in Wednesday attendance from Spring 2000 (51107) to Summer 2000 (74476) is 46%. We can use these percentages to predict what the attendance would have been had the competitors not implemented 2-for-1 pricing.

**We can use the following formula to estimate the counterfactual Wednesday attendance:**

*Cinemex Wednesday Attendance in Spring 2000 x yearly effect x Summer effect = what Cinemex estimated attendance would have been without the competitor’s price change.*

$51,107 * 1.27 * 1.47 = 94,763$  (estimated Wednesday attendance, had the competitors not introduced 2 for 1 pricing).

Compared to the actual average number of attendees on Wednesday in the Summer of 2001, (74,376) the predicted attendance based on the year to year and season to season percent increases is 22% higher than the actual attendance – or about 20,396 people on average.

Additionally, using the multi regression we ran, we can see that the coefficient for Dummy Competitor is (-6,471), meaning the 2-1 pricing led to Cinemex Attendance falling by 6,471 people on any given Wednesday once the 2-1 pricing was introduced.

Our results of both of these methods together show that the implementation of 2-for-1 pricing by Cinemex’s competitors had a negative effect on theater attendance for Cinemex.

**G) Building on the approach you developed above, quantify the impact of Cinemex's own 2-for-1 deal on its Wednesday attendance? Discuss your methodology in terms of a demand diagram framework.**

In order to quantify the impact of Cinemex's own 2-for-1 deal on its Wednesday attendance, we will consider the relationship between Cinemex's Summer and Winter Wednesday attendance when price is held constant between the two seasons.

Looking at 2000, we can see that Cinemex's average Wednesday attendance dropped over 31% from Summer to Winter. And in 2002, Cinemex's average Wednesday attendance dropped almost 24% between Summer and Winter. This suggests that there is usually a significant dropoff in Wednesday attendance from Summer to Winter – which would make sense, considering some of the factors we discussed in part A (e.g. summer holidays and heat waves may increase demand during the summer months).

Cinemex Average Wednesday Attendance						
	2000	% Change Between Seasons	2001	% Change Between Seasons	2002	% Change Between Seasons
Spring	51,107		65,103		97,555	
Summer	74,476	+ 46%	74,367	+ 14%	129,615	+ 33%
Winter	51,109	- 31%	74,035	+ 0%	98,619	- 24%

**f) Subset of chart e) showing only Wednesday attendance.**

However, when we look at 2001, we see that Cinemex's average Wednesday attendance remained roughly the same between Summer and Winter. This is significant, as it implies that Cinemex avoided the usual post-Summer decline in attendance.

If we take the average Summer-to-Winter seasonal impact from 2000 and 2002 – years where ticket price was held relatively constant – we could say that Cinemex generally sees a decrease of 27.5% in Wednesday attendance from Summer to Winter. So by implementing their 2-for-1 pricing in August of 2001, Cinemex increased their expected Winter Wednesday attendance by roughly 27.5%.

In terms of a demand diagram framework, Cinemex's demand curve for Wednesdays generally shifts leftward during the change of seasons from Summer to Winter, heralding a decrease in demand for tickets at the same price. However, Cinemex's introduction of 2-for-1 pricing in August 2001 caused movement downward along the demand curve in such a way that the usual seasonal shift did not result in lower demand. We can see this effect in graph g) below.



**g) Shift in demand curve as a result of seasonal effect and price change in 2001.**

It is also worth noting that Cinemex's overall Wednesday attendance increased significantly going into 2002, and their Summer-to-Winter dropoff in Wednesday attendance was 7% less in 2002 than it was in 2000. This further suggests that implementing 2-for-1 pricing had an overall positive effect on Cinemex's Wednesday attendance.

**H) Extending the analysis from the previous question, provide an estimate of Cinemex's demand elasticity (with respect to its own price) for Wednesdays.**

Price elasticity of demand = (% change in qty demanded) / (% change in price)

% Change in Quantity Demanded between Winter 2001(74035) and Spring 2002 (97555) : 32%

% Change in Price between Winter 2001 (\$15.04) and Spring 2002 (\$16.28) : 8%

$32 / 8 = 4$ , which indicates very high elasticity.

See the table below for the demand elasticities we've calculated for the months following Cinemex's implementation of 2-for-1 Wednesdays:

Time period	Average Cinemex Attendance (Wednesday)	% Quantity change between seasons	Average Ticket Price Cinemex (Wednesday)	% Price change between seasons	Price Elasticity of Demand
Winter 2001	74,035		\$ 15.04		
Spring 2002	97,555	32	\$ 16.28	8	4
Summer 2002	129,615	33	\$ 17.13	5	6
Winter 2002	98,619	-24	\$ 18.08	6	4

**h) Price elasticity of demand calculated after Cinemex's 2-for-1 price change shows high elasticity.**

Once Cinemex introduced their 2-for-1 pricing strategy, we can see that their price elasticity of demand was quite high. This indicates that their demand is very sensitive to changes in price. In such cases, adjusting pricing or implementing promotional pricing can be an effective strategy to increase demand.

**I) No model is ever perfect. Discuss what the shortcomings of your analysis are likely to be. If you could, what extra data might you want to collect? Do you think your estimate is likely too low or too high (or is it hard to tell)? Why?**

One of the major shortcomings of our analysis is that we do not have ticket price data for Cinemex's competitors, or for the city overall. While the implementation of 2-for-1 Wednesday pricing by Cinemex's competitor does seem to have negatively impacted Cinemex's attendance, we do not know anything about the competitors' baseline pricing, or about average ticket prices for Mexico City. If we had additional ticket price data, we may be able to draw firmer conclusions.

Another shortcoming of our analysis is the degree to which box-office blockbusters or flops may impact average cinema attendance for a given year. For example, the release of Marvel's *Endgame* in Spring 2019 attracted a record number of cinema theatergoers worldwide.<sup>1</sup> Since our data does not include any information about the popularity (or lack thereof) of the particular movies playing at cinemas in Mexico City during this time period, we are unable to determine whether the changes we've observed in demand could be attributed to the popularity of specific movies playing at the time.

In terms of extra data we'd want to collect, it would be helpful to see the attendance and pricing data for a wider timeframe. The database we have leads us to draw conclusions based on a relatively narrow period of time – starting roughly 1.5 years prior to the introduction of 2-for-1 pricing, and continuing roughly 1.5 years into the 2-for-1 pricing. Considering that we're trying to draw larger conclusions about elasticity of

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<sup>1</sup> <https://www.npr.org/2019/04/29/718394120/avengers-endgame-turns-previous-box-office-record-to-dust>

demand and controlling for external factors, the ability to compare attendance data across more years would help us to more confidently and accurately calculate our answers.

Due to all of these shortcomings, it is hard to tell whether our estimate is likely too low or too high.

**J) Bottom line: Was Heyman right to match the 2-for-1 pricing? Discuss.**

Based on our analysis, we have concluded that Cinemex lost a significant percentage (22%) of expected ticket sales immediately after their competitor introduced 2-for-1 pricing. Once Heyman introduced 2-for-1 pricing in August of 2001, Cinemex was able to not only recapture the attendance they'd lost, but attract additional customers – i.e. their actual attendance after August 2001 was higher than their expected attendance based on prior year data. Additionally, from the Summer of 2001 to the Summer of 2002, both the Wednesday attendance and market share percentage of Cinemex increased by over 70%, indicating that the implementation of 2-for-1 pricing allowed Cinemex to make the most of the boom of the summer season.

With this in mind – and considering that increased attendance doesn't only mean higher ticket sales, but would conceivably result in higher concessions sales as well – we do think Heyman was right to match the 2-for-1 pricing. Mexico City is a very price-sensitive market, as exhibited by the high  $\epsilon$  calculated in question H. Cinemex needed to take action in order to retain their foothold in the industry, and given that Cinemex's Wednesday demand is elastic, we can surmise that lowering the price was an effective course of action.