Dynamic Ticket Pricing: Model and Application

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Dynamic ticket pricing has revolutionized pricing for businesses over the years. This technique has been able to incorporate different factors into setting the price for their products, which goes along with the demand of their customers. The model has components like the market model, the optimizer and the forecaster. Even though, dynamic ticket pricing was primarily created for airlines, it has been adopted and modified in different sectors like utility companies, hotels, retail, sports and on-demand services. This is a business strategy that has been around since 1956 and it will continue to grow and revolutionize different industries especially e-commerce.

INTRODUCTION

Over the years, technology has grown and evolved in different sectors especially in business where technological processes have been developed to aid in increasing efficiency and practices in business. Through these processes, strategies have been able to be refined and changed. Through these changes, the whole concept of dynamic ticket pricing was introduced. According to *Businessdictionary.com*, dynamic ticket pricing is defined as, "The process of determining a product's value in commercial transactions in a fluid manner depending on current market conditions, where it is gaining ground among business owners compared to the more traditional fixed pricing method. Also called real time pricing". Through dynamic ticket pricing, businesses can change and fix their prices for products and services that are highly flexible on real time. This allows companies and businesses that sell their products and services over the internet to change their prices based on market demand.

HISTORY

The idea of dynamic ticket pricing was not created out of thin air. It was first derived from the Semi-Automatic Business Research Environment which is also known as SABRE. SABRE came to life after the president of American Airlines, C.R Smith met with an IBM salesman on a flight in 1953 and came up with the concept. SABRE corporation was officially founded in 1960 by American Airlines and its first reservation system was installed in New York in the same year. In 1976, the system was transferred

for the very first time into a travel agency. In 1984, Sabre introduced *BargainFinder,* which was the first automated low-fare search engine for the industry. The following year in 1985, Sabre introduced *easySabre* which allowed consumers with access to personal computers to have access to the sabre system to make reservations such as airline, hotels and car rental. And in 1996, Sabre launched Travelocity which is a well-known search engine used for booking airlines and hotels around the world (Anthes, 2004). It was reported that Travelocity was then sold to Expedia Inc. for $280 million cash in 2015 (Dastin, 2015).

THE MODEL

The model used for dynamic ticket pricing has different components such as a market model, an optimizer and a forecaster. Nowadays it is common for airlines to view price as a new revenue management process. It was also well known that the motivation of using restrictions such as pricing problems that allow firms to pre-set price levels and allow firms to apply yield management tools to micro-manage the allocation of those prices. These restrictions allow the market to be segmented and the firms to be able to further exploit revenue potentials in different consumer groups (Li, 2006). The placement of the model was to fulfill the objective of evaluating the performance and economic effects of the dynamic ticket pricing strategy in airlines.

The market model was constructed in such a way that, they assumed the supplier selling a product to a consumer at a time. The only way the consumer would end up purchasing the product is if the price of the product is lower compared to the expected price that the consumer is willing to pay for it or else he or she will leave empty handed. But the seller can place some restrictions of the price range for the product he or she is selling, either for marketing reasons or perception of the prices for the product. The optimizer component of the model uses, "dynamic programming which is the only exact and efficient technique available for solving the problem of optimization over time in the general non-linear, stochastic case" (Burger et. al, 2005). It is based upon the Bellman's principle of optimality which argues that, "an optimization problem can be solved by recursively solving Bellman's equation to find time-consistent policy functions" (Burger et. al, 2005). The third and last component of the model is forecasting, where the dynamic probabilities meaning the maximum likelihood method is used. Through this component, instead of the seller having to know the customer's arrival rate in advance, the model has a key assumption that allows the seller to estimate the demand instead. Which means pre-market research is recommended to figure out the first moments of the demand distribution. But after the seller can predict the customer's probability of demand and sales keep increasing, then sales data can be collected in real time and added to the demand curve model to figure out customer's arrival rate.

APPLICATIONS

Electric Companies

The dynamic ticket pricing is no longer used in airlines only, but it has been adopted into other sectors, industries and businesses. A good example is the US electricity companies; whereas, "In 1980, the US electricity suppliers started to set prices in relation to demand. The most feasible way to do so was by the implementation of time-of-use (i.e. TOU) rates or dynamic pricing. This allowed utilities to pass to consumers at least part for the price variation occurring within a given period, thus decreasing demand when supplies are tightest. Once exposed to electricity prices that vary during the day, consumers are likely to alter their consumption patterns especially during critical peak periods" (Burger et.al,2005). Dynamic pricing started as a business strategy that would adjust the price of a product over time to give the business the opportunity to allocate the "right service, to the right consumer at the right time" (Burger et.al,2005). When prices are variable and can be continuous controlled on a regular basis, prices of products can be set dynamically to maximize expected total revenues especially for perishable goods, which are defined as goods that must be used in a short period of time.

Hospitality

Booking hotel rooms either online or even through the phone, still doesn't change the fact that at every hour the rates for every room changes and as a customer if you want to get a good deal for a room meaning you have to hunt, research or just figure out the best time when the demand of the rooms that you want would be low so you don't have to overpay for your hotel room. Hotels update their room rates daily or within a time spa of a day depending on the demand and if any necessary adjustments must be made. These adjustments and room rates are based on the right charge for the room as well as the willingness to pay for the room by the customer (Forgacs, 2010). The major trick for hotels is pricing their rooms with in a range where, they cannot underprice a room or else they will leave money on the table and if they over charge the rooms then they can over price themselves out of the market hence hotels have to constantly respond to the supply and demand conditions, but it is difficult to determine the price of the room in a day. Dynamic ticket pricing allows revenue managers to make decisions on the direction of room pricing that they want to make depending on what their expectations would be on a given day based on their forecasting models. When using dynamic ticket pricing, the manager can lower the prices if he or she wants to have more occupants in the hotel, so they could reach their forecasting numbers, or they could also increase their prices when the supply is low and there aren't any rooms available. But dynamic ticket pricing allows the manager to not only use price as a factor but also other characteristics such as forecasting numbers and end up using price only as a competitive factor as well as a strategic decision.

Sports Ticket Pricing

In the entertainment industry, sports ticketing has been one of the segments that uses real-time pricing or also known as dynamic ticket pricing to increase their revenue. Sports ticketing uses a similar model the way hotels uses dynamic ticket pricing but, yet it is different. Sports fans are usually ticketed depending on various factors like the teams they are playing, the popularity of the team and players as well as if the game is a regular season game or a finals game. "In 2010, the San Francisco Giants became the first professional team to implement a comprehensive demand-based ticket pricing strategy called dynamic ticket pricing (DTP) due to increasing operating costs resulting from rising player salaries and lavish sport-specific facilities, sport managers have been forced to search for additional revenue streams. New and expanded sponsorship and media deals have helped offset the increase in expenses in the last ten to fifteen years. However, sport managers are continually forced to consider additional ways to maximize revenue" (Shapiro, et.al., 2012). With such a solution in hand, several other major league baseball teams started implementing this strategy to their organizations as well. But they also applied variable ticket pricing (VTP) which allowed teams to set the prices for such games at very high prices. But also, some other variables are seasons meaning a baseball game ticket price would be cheaper during the winter compared to the summer as well as rainy days versus sunny days, game time and the opponent are also factors to be considered.

Sporting events are a good candidate for dynamic ticket pricing because the seats are perishable goods, as well as the inventory which is fixed and perishable. Because there is limited seating in baseball stadiums, additional seats cannot be sold once the whole stadium has been filled up which means that once the event has passed, that ticket has no value which creates fluctuations in demand.

Dynamic ticket pricing is also used in the National Basketball Association (NBA) games. A good example on the way dynamic ticket pricing was put to play was when the Golden State Warriors broke one of the biggest records in the league and earnest themselves a spot as the number one team in the league. The ticket prices for the league is normally around $148 on average but for the Golden State Warriors their average ticket prices were $344 on average and they were able to sell out the Oracle Arena stadium which can hold roughly 19,600 people for the 2015-2016 season. On bigger anticipated games like playing a popular opponent like the Cleveland Cavaliers, the average was increased from $344 per game to $880 per seat per game (Pramuk, 2015). With such a successful team and a growing fan base, revenue managers take advantage of such factors and can charge sports fans more money for games that

they have forecasted to be high in attendance based on factors like opponents, the current standing of the team in the league as well as the number of championships won by that team.

Retail Pricing

The prices of retail products online change frequently based on different factors such as time, competition, online traffic and sales goals. In online retail, dynamic ticket pricing has the main goal of increasing sales, revenue and profit. Online retailers can use dynamic ticket pricing by increasing prices when the demand is high or cutting down pricing when the demand is very low. Another way that retailers can use dynamic ticket pricing is by using price intelligence which is also known as competitive price monitoring. Pricing intelligence is the use of market-level pricing techniques and the impact on business while using modern data mining tools. It is very different from other models because of accuracy of its competitive analysis (Baird, et.al., 2013)

Amazon. com is one of the most successful retailers online right now. It is a place online which is highly saturated with sellers of more than 3 million. Using dynamic ticket pricing, sellers can change the price of products to increase competition. An average shopper would always end up purchasing products from Amazon because of their low prices but, "That's not always true. In fact, Amazon will tweak its prices many times per hour (equaling millions of individual price changes per day), taking advantage of the psychology of price perception" (D'Onfro, 2015). Amazon uses this smart strategy to underprice bestselling and high traffic items to influence the perception of buyers to think that they are the ones selling the lowest products in the market. But to compensate for this, Amazon over prices other products that are not the bestselling and does not have the highest traffic to compensate for the difference. A good example was, "Boomerang found that a popular $350 Samsung TV that Amazon price-tested for six months before discounting it to $250 on Black Friday. That price point undercut competitors and Amazon likely sold a bunch of TVs. However, at the same time Amazon discounted the TV, it jacked up the price of a HDMI cable that people would want to buy alongside the TV" (D'Onfro, 2015).

On-Demand Services

On-demand services are products that are usually encompassed where their primary marketplace is through mobile use which allow convenient access to the fulfillment of those services and products. Some of the sectors that on-demand services are mostly used are food, retail same-day delivery, beauty and health services (Kokalitcheva, 2015). Some popular on-demand services are Uber which is an online transportation company that allow users to request services whenever and wherever they are with the convenience of choosing their own driver based on the list they provide. One of the techniques that Uber uses to charge their customers for their services is surge pricing (Valentine, 2015). Also, Uber tends to use only one side of dynamic ticket pricing which is using the strategy to increase their prices and not to lower them. Last year, Uber was charging as much as $1000 per ride on New Year's Eve in New York based on the high demand of that day and "One driver bragged about a $300 fare for a few short miles from midtown Manhattan to Brooklyn" (Alesci, et.al., 2015).

When Uber is price surging, it is encouraging drivers to get back on the road and get more customers but unfortunately the surges could only last a few minutes because there would be high number of drivers on the road but very few customers which means there is a low demand for the service.

FIGURE 1
UBER SURGE PRICING DURING NEW YEAR'S EVE

Based on the figure, it shows that the Uber service usually has high demand in the evenings especially on New Year's Eve. With the highest demand around 2am when everyone is trying to get home and the lowest demand for the night would be around 10pm.

But another on-demand service is Sprig which is a food delivery service company that, "serves in San Francisco and Palo Alto, jumped into the dynamic pricing game starting in October of 2014 in a slightly less conventional way — it features both price increases and decreases. Uber will never send you a notification that says, "demand is low; your ride will be half off!" Sprig, on the other hand, claims to provide "free delivery when demand is low, compared to the base delivery fee that starts at $2" (Valentine, 2015). Both on-demand services use dynamic ticket pricing, where Uber tends to use it to only increase its prices, but Sprig tends to use to increase as well as decrease its service prices.

CONCLUSION

Dynamic ticket pricing is the process of determining the product's value in commercial transactions This means that businesses can use this strategy to change prices for their products as often and as many times as possible based on the demand of the market. Dynamic ticket pricing was created in 1953 but since then, this strategy has grown and evolved in so many different sectors. Even though it was originally created for improving scheduling and assignment of prices for airlines, that strategy has evolved, and hotel managers adapted it. The strategy has also been adapted in sports where revenue managers are able to alter the prices of the tickets based on the opponent their team is playing, the weather conditions that is if it is winter which means that the tickets would be priced at a lower amount or if the games are in the summer then they would be priced at a higher amount, as well as the position of the team is taken into consideration.

Recently, dynamic ticket pricing has been adapted into online retail pricing where sellers are able to set their own prices for the products and at Amazon.com, sellers are able to alter the prices of products to increase competition. This is a more recent use of the dynamic ticket pricing strategy. Amazon has taken it a step further and used price intelligence to decrease prices on popular products to influence an average customer to think that Amazon sells all their products at a lower price. The strategy was also recently implemented through on-demand services such as Uber and Sprig.

All in all, dynamic ticket pricing is one of the most recent strategies that I believe will keep on growing and will continue to be adapted in other business sectors as well, especially in ecommerce since there has already been success in retail in the recent years.

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