A Profitability Analysis of Purchasing Secret Edition in Blind Boxes: A Case Study of Pop Mart's Hirono Echo Series

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Abstract. This study conducts a profitability simulation of purchasing blind boxes by taking an example of a series called Hirono Echo in Pop Mart. This simulation analyzes the probability of drawing the secret edition in the blind boxes. Using geometric distribution to simulate the experiment, this study simulates the profit and cost of consumers who purchase the blind boxes. The result of this simulation indicates that the expected spending of getting one secret edition is around 10000 RMB and the corresponding expected trials that consumers need is 144. But the expected market value of this secret edition is only 491.885 RMB which is quiet less than the expected spending. 95.24% people overpay the secret edition, and the top 10% people account for 33.3% of total revenue. This study highlights the economic inefficiency of blind boxes market and the irrational behavior of consumers. And this study doubts the perception of "luck" associated with blind boxes purchasing. The limitations of this study contain the lack of thinking the situation the consumers want to collect the whole set of this series and the different behaviors in the real life. This analysis provides insights into consumer psychology and the financial dynamics of the booming blind box market.

Keywords: Blind boxes, geometric distribution, rational purchasing, budget planning, market value comparison.

1. Introduction

With the development of the blind boxes market, many young people in China prefer purchasing this kind of uncertainty product. Blind boxes have gradually become a cultural symbol and even a social currency for the young generation. A large number of people are willing to buy blind boxes at high prices, and they even purchase specific toys from blind boxes at unbelievable, often inflated, secondary market prices. Some consumers compare the experience of buying blind boxes to a lottery—while most people receive common items, a few lucky ones obtain rare editions with significant monetary and emotional value.

This study aims to explore the economic logic behind blind box purchases and the risks of overspending, using the Hirono Echo series as a case study. It focuses on the financial implications of chasing rare "secret editions" and provides suggestions for rational consumption. The research combines probability analysis with market data to evaluate expected outcomes versus real costs. The paper is organized into three parts: methodology, data analysis, and discussion with practical recommendations.

2. Literature Review

2.1. Introduction to Pop Mart

Beijing Pop Mart Cultural and Creative Co., Ltd. was established in 2010 and is a leading trend culture and entertainment company in China. After more than ten years of development, Pop Mart has built a comprehensive operation platform covering the entire trend toy industry chain, mainly focusing on five areas: global artist discovery, IP incubation and operation, consumer reach, trend toy culture promotion, and innovative business incubation and investment. With a strong focus on originality and IP development, Pop Mart collaborates with both emerging and established designers to introduce unique and emotionally resonant characters. To enable more young people who love collecting toys to have a deeper understanding of its brand philosophy of "creating trends, spreading

joy, igniting passion and bringing happiness", Pop Mart has successfully held six International Collectible Toy Expos in Beijing and Shanghai, filling the gap in the domestic collectible toy industry. These expos not only serve as product showcases but also provide interactive spaces for fan communities and designer engagement, further strengthening the emotional connection between consumers and the brand [1].

2.2. Hirono Echo Series

This series represents one kind of Pop Mart blind boxes. In this series, there are 12 regular editions and one secret edition. Each edition is a dedicated toy with the name “Hiding Behind You, Daydreaming, Journey in the Rain, Get Lucky, Back Off, Breakout Plan, Pieces of Memory, Soul Connection, staying up, Knight, Eaten, Caught You, Never Growing Up” [2]. When consumers buy one Hirono Echo blind box, they may randomly receive one of these 13 toys. But the probability of these 13 toys is different. The probability of regular editions is (1-1/144)/12 and the probability of the secret edition (Never Growing up) is 1/144 [2]. In this study, it wants to determine the cost and profit of consumers when they purchase the secret edition in Hirono Echo series. This uneven probability distribution not only increases the uncertainty of purchase but also leads to intense speculation and pricing volatility in the secondary market. Collectors who aim to complete the series or obtain the secret edition may spend large sums of money either by continuously purchasing blind boxes or by purchasing the rare toy directly at high resale prices. In this study, it aims to determine the expected cost, potential losses, and consumer behavior patterns when individuals attempt to obtain the secret edition in the Hirono Echo series, offering insight into the economics and psychology of blind box consumption.

2.3. The Rise of Blind Boxes

Pop Mart earn a huge profit from selling blind boxes as the biggest blind boxes company in China. With its nationwide brand recognition and strong marketing strategies, Pop Mart has successfully transformed what was once a niche toy category into a mainstream consumer trend. The development of Pop Mart represents the rise of blind boxes in Chinese market. This study investigates the financial statement of Pop Mart in 2023.

Table 1. Financial statement of Pop Mart in 2023 (Data from: www.annualreprots.com).

	2023 (Unit: one thousand RMB)	year to year change (%)
Profit	13037749	106.9%
Gross profit	870765	125.4%
Operating profit	415427	237.6%
Profit before income tax	4365812	208.4%
Net profit for the year	3308345	203.9%
The profit attributable to the owners of the company	3125473	188.8%
Non-IFRS Adjusted Net Profit	3403162	185.9%
Basic earnings per share (RMB yuan)	2.36	191.4%
Diluted earnings per share	2.35	190.1%

In this statement, Table 1 shows a huge and increasing profit of purchasing blind boxes. This result seems to meet the selling method called opaque selling strategies [3].

This strategy indicates that producers have some uncertainty in their products. This action can stimulate consumers' uncertainty preference and gambling mentality, arouse their purchasing desire and increase profits. Pop Mart’s blind boxes fit this strategy, and many young people are willing to buy these blind boxes. In the consumers study, 52% young people in China spend 100-500 RMB to purchase blind boxes [4].

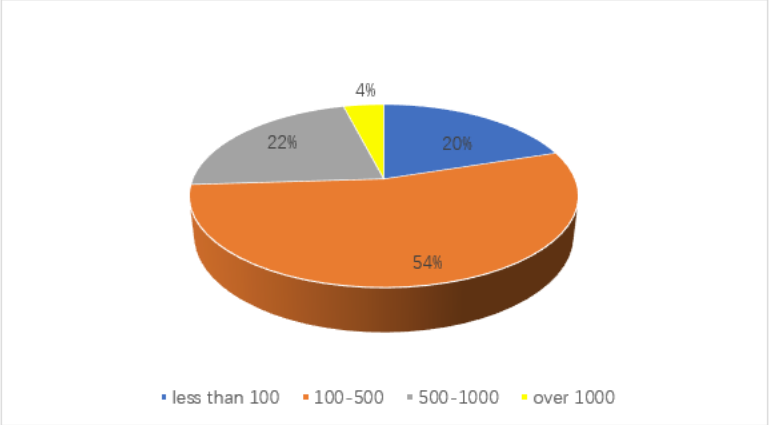

Fig 1. The expense spent on blind boxes [4].

Fig. 1 shows many young people spend a lot on purchasing blind boxes. More than 25% of young people spend more than 500 RMB purchasing blind boxes, which is a significant figure given the relatively low cost of individual blind boxes.

2.4. Profitability Mechanisms of Blind Boxes

Blind boxes have become a profitable business model because of their unique ability to combine uncertainty with consumer psychology. Prior studies indicate that uncertainty itself stimulates irrational consumption behaviors, such as gambler's fallacy, instant gratification, and perceived scarcity, which encourage repeated purchases beyond rational limits [5]. In addition, the purchase intention of consumers is strongly mediated by perceived value—especially emotional and social value—which blind boxes successfully generate by providing surprise, collection status, and community belonging [6]. From a marketing perspective, blind box companies further amplify profits by relying on IP design, scarcity of rare editions, and addictive purchasing patterns, creating a continuous demand cycle [7]. Moreover, a comprehensive review suggests that irrational consumption is the core of the blind box economy's profitability, since the low probability of winning rare editions pushes consumers to overspend compared with market value [8]. These mechanisms together explain why blind boxes are not merely toys but sophisticated profit-maximizing instruments.

2.5. The Deficiencies of Existing Research

However, existing research primarily focuses on psychological motivations, neglecting quantitative analysis of cost-benefit outcomes for consumers. While Elmachtoub et al. theorize corporate benefits from opacity, no study has modeled the actual economic burden on buyers—especially for ultra-rare items (e.g., 1/144 secret editions). These items often become the most sought-after in a series and acquiring them through blind purchase methods involves significant financial risk and sunk cost [3].

Our work bridges this gap by simulating expected costs through geometric distribution and empirically comparing them to secondary market values.

3. Methodology

In order to simulate the whole process of purchasing blind boxes, searching the probability of the secret edition, the price of one blind box and the market price of the secret edition are essential to finish the experiment.

3.1. Data Collection

By reading the official website of Pop Mart, this study investigates the probability of the secret edition-Never Growing up, which is 1/144 [2]. Also, this study searches for the selling price of one Hirono Series blind box which is 69 RMB [9].

In this study, it needs the market price of the secret edition in order to analyze the cost and profit of consumers. A random sample of 200 units was selected to determine the actual value of the secret model. This research utilized the Chinese second-hand trading platform Xianyu to carry out this process. First, search for "Never Growing up" and record the highest and lowest prices of this product. Finally, random sampling is conducted directly at the highest and lowest prices. Record the price information of 200 samples and then perform the calculation of the expected value.

3.2. Geometric distribution

To conduct a simulation of the blind box lottery, a certain calculation method is necessary. In this study, it aims to investigate the probability of consumers drawing the hidden edition. This model for calculating the probability of the success of the experiment for each trial follows a geometric distribution.

$$P(X = k) = (1 - p)(k - 1)\, p \quad (1)$$

Geometric distribution is a type of discrete distribution. It is used to describe the number of trials required for the first success. In this distribution, there are only "success" and "failure". The letter p represents the probability of success and the (1-p) represents the probability of failure. K represents the success that happens at kth attempts. In the blind box lottery, this distribution can be used to calculate the probability of drawing the secret edition in a particular draw. This is a very important quantitative tool.

$$E[X] = 1 / p \quad (2)$$

This equation is the calculation of the expected value in geometric distribution. This formula plays a role in the simulation of the trading box in that it can calculate the expected number of times people will draw the secret edition.

3.3. Ways of Python Coding

This research aims to simulate the lottery process of the blind box using the geometric distribution. The geometric distribution is suitable for modeling situations where each trial is independent and has a fixed probability of success, which aligns with the random draw mechanism of blind boxes. This requires a large number of consumer simulations as well as the generation of random values based on geometric distribution parameters. To efficiently complete this process, simulation is carried out using computational methods Specifically, the study uses Python programming to build the simulation environment. By utilizing statistical libraries and random number generators, the code generates simulated outcomes for each consumer based on the known probability of drawing the secret edition. In this case, the secret edition in the Hirono Echo Series appears with a probability of 1/144. In this study, it simulated the purchase of 100,000 consumers of collectible boxes. Everyone is an independent individual. The Python code assigns random variables to each person and collects the data of 100,000 individuals. This research inputted the probability data of the Hirono Echo Series figurines into the computer and conducted the final simulation. The computer eventually produced a series of important data regarding this simulation, including the simulation diagram and the expected values.

4. Results

4.1. The Expected Market Price of Never Growing up

By inputting the prices of 200 samples into an Excel spreadsheet, a scatter plot was created. Each point represents a sample (Fig.2).

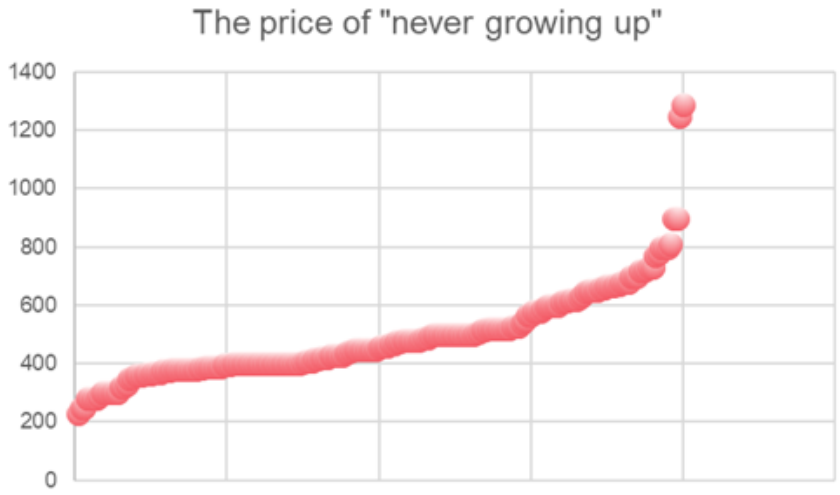

Fig 2. The market prices of "Never Growing up".

This research first organizes all the data. It then sorts all the data from largest to smallest. This study examined all 200 pieces of data and found that they were relatively concentrated around 500. In order to obtain the expected value, the experiment input all 200 data into the calculation. Through the calculation of expected values, this study determined that the expected market value of the hidden model is 491.885 RMB.

4.2. The Visualized Simulation

Through the simulation of Python code, this experiment conducted 100,000 rounds of simulated lottery draws. And the computer produced a visualized result.

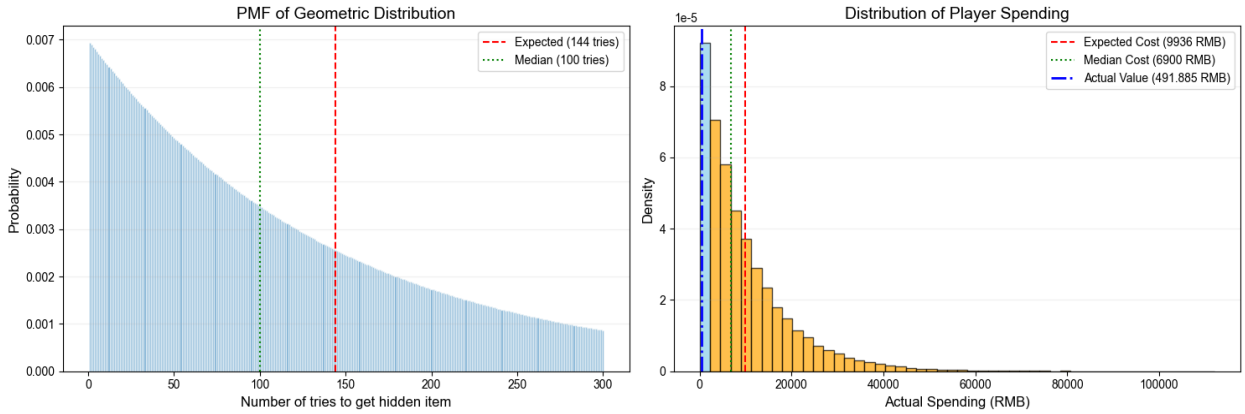

Fig 3. Visualized simulation result.

This visual graph presents all the simulation results in a clear and interpretable manner. Fig. 3 is divided into two main sections. The left part of Fig. 3 illustrates the probability distribution of draws—specifically, the likelihood of successfully obtaining the secret edition in a given number of blind box purchases. This part reflects the inherent randomness and low success probability involved in the blind box mechanism. In contrast, the right half of Fig. 3 represents the distribution of total expenses, showing how much money consumers are likely to spend before acquiring the secret edition. Both halves offer insight into the financial implications of participating in the blind box economy.

In terms of visual cues, the red line in both sections indicates the expected value derived from the simulation. On the left, the red vertical line corresponds to the expected number of attempts needed to obtain the secret edition, which is 144 tries. Given the unit price of 69 RMB per blind box, the corresponding expected total cost is approximately 10,000 RMB. This is a significant Fig. 3, as it is about 20 times greater than the estimated market value of the secret edition in secondary markets [9]. This stark disparity demonstrates the substantial economic inefficiency embedded in the blind box purchasing model.

See the green line, which represents the median rather than the mean. The green line on the left shows the median number of draws required to obtain the secret edition. The corresponding median cost on the right side is around 7,000 RMB, translating roughly 13 times the actual market value of the secret edition. Even at the median level—often seen as a more "typical" consumer experience—the cost remains significantly inflated, highlighting the financial risk for ordinary buyers.

On the right side of Figure 3, there is also a blue dotted vertical line, which denotes the actual market value of the secret edition (approximately 492 RMB). All the yellow areas to the right of this line represent consumers who have overpaid—they spent more money purchasing blind boxes than the secret edition is worth in resale markets. This area encompasses the majority of consumers, visually emphasizing the asymmetric cost-benefit structure of the blind box system. In essence, this simulation demonstrates that most consumers are likely to incur a financial loss, paying significantly more than the true value of the product they are seeking.

4.3. Data of the Python Code

The Python code not only produced a visual graph but also returned a variety of statistical simulation results that shed light on the financial implications for consumers. Most notably, it calculated the number of consumers who overpaid in the pursuit of the secret edition. The yellow-shaded area in the cost distribution chart represents these overpaying consumers. According to the data, a total of 95,055 out of 100,000 simulated consumers—equivalent to 95.06%—spent more money acquiring the blind boxes than the actual market value of the secret edition figurine. This means the vast majority of consumers experienced a significant negative return on their spending.

The simulation also examined spending thresholds. It revealed that 90% of consumers required no more than 333 attempts to draw the secret edition, translating to a total cost of no more than 22,977 RMB. Figure 3, while being a statistical upper limit for the majority, still vastly exceeds the average resale value of the secret edition on the secondary market. The economic inefficiency embedded in this randomized purchasing model is thus clearly illustrated.

Top 10% of consumers who spent the most accounted for 33.3% of the total consumption. This indicates a significant consumption disparity among buyers. While some consumers were fortunate enough to acquire the secret edition early on, others had to invest substantial amounts with no guarantee of success. Such a skewed distribution suggests that Papercut, the producer of the Hirono Echo Series, benefits greatly from this structural imbalance. A small portion of “whale” consumers end up driving a large percentage of total revenue, while most players accept disproportionate financial risks.

This economic asymmetry lies at the heart of blind box marketing strategies. It exploits randomness and emotional investment, making the blind box model not only a form of entertainment but also a mechanism for profit maximization rooted in consumer uncertainty.

5. Application

Based on the data obtained from this experiment, people need to be extremely cautious when purchasing blind boxes. This experiment provided people with some valuable suggestions. Make reasonable purchases of blind boxes. Plan out the desired style and then check the actual prices on the trading websites or in the offline trading stores. Make a budget plan and compare it with the actual market prices. Finally, the option of obtaining it through a lottery draw will be chosen. Be a rational person rather than a gambler. Don't blindly pursue the neural excitement brought by the lottery and ignore your huge losses. When choosing to participate in a lottery, do not blindly believe in the luck brought by the expected value. Feeling lucky doesn't mean you are actually lucky. Just as the experimental data shows that among the first 50 percent of people, 90 percent still spent too much money. Businesses always make profits. They will target those who participate in blind lotteries. Those people will overlook the actual value of the goods in pursuit of psychological satisfaction. Those people contributed the majority of the income. Therefore, during the lottery process, one should

take into account one's own expected outcome as well as the price already spent. Don't make deals that result in losses. Always remember that careful planning, self-control, and a clear understanding of the actual market value are essential to prevent regret and financial loss.

6. Conclusion

First, expectations can significantly influence consumers' purchasing behavior. In this simulation, the expected value is much greater than the median. The median represents the point that divides the population into two equal halves. This means that half of the people will spend less than the expected amount, which makes them feel lucky because they spent less than anticipated. However, the study shows that even within this group, 90% still overpaid compared to the actual value of the hidden model. People need to redefine the concept of "luck."

Second, the results indicate that most people spent more money on obtaining the secret edition than its actual value. This is because the probability of getting it is extremely low, only around 0.69%. As a result, people had to buy many blind boxes before finally getting the rare piece. For example, the expected number of tries is 144, which means consumers are likely to spend almost 10,000 RMB—about 20 times the real value of the secret edition. This shows that the system makes most consumers overpay, turning what seems like a fun purchase into a costly gamble. Furthermore, the simulation found that the top 10% of consumers with the highest spending contributed 33.3% of the total money spent. This suggests a strong consumption imbalance. While many believe that everyone has the same chance of drawing the hidden item, those who fail repeatedly tend to spend more and more, which ultimately brings huge profits to companies like Pop Mart.

Finally, this study also has some limitations. In real life, obtaining the secret edition is not the only goal for consumers. Many people aim to collect the entire series rather than just one rare piece, creating a completely different spending pattern. The probability and cost of completing a full set involve more complex consumer behaviors, which were not analyzed in this study. This could be an important direction for future research, as it may reveal other types of overpayment or different sources of consumer satisfaction. In addition, this research simulated 100,000 consumers drawing continuously until they obtained the secret edition. In reality, not all consumers would be willing or able to spend the extremely high amounts predicted by the model, which means actual behavior might differ from the simulation.

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