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A Literature Review on the Theory of Asymmetric Information

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Abstract: Asymmetric information refers to a situation in which one of the parties involved in a market transaction has more information than the other, which reduces efficiency in resource allocation. The basic reasons are the high cost of information acquisition, blocked information transmission channels, and lack of enough information disclosure. Problems such as adverse selection and moral hazard created by asymmetric information damage the efficiency of the market. Asymmetric information has played a very important role in lending, hotel, and catering. As for the industry of lending, the existence of asymmetric information between borrowers and lenders would make it easy for high-risk borrowers to obtain loans and, further, increase the risk of default. Asymmetric information within the hotel industry makes it hard for consumers to judge the hotel's service quality and price rationality. Asymmetric information affects investment decisions and enterprise efficiency in the catering industry, distorting valuation and causing investment loss. Addressing asymmetric information in various industries is crucial for fostering market transparency and efficiency. To achieve this, researchers must employ both signaling and screening models to mitigate the adverse effects of information asymmetry. This paper examines historical literature on asymmetric information across diverse industries and delineates strategies to enhance information transparency and promote more informed decision-making.

Keywords: Asymmetric information, lending industry, hotel industry, catering industry.

1. Introduction

1.1. Definition and Impact of Asymmetric information

Asymmetric information is a situation in which the level of information that two parties involved in a market transaction have is not equal. Generally, asymmetric information in a market transaction may lead to inefficiencies in resource allocation and, in worst cases, finally to market failure. As a matter of fact, asymmetric information in markets may cause two problems — adverse selection and moral hazard. George Akerlof's "lemon problem" is a classic example of how asymmetric information dominates the market for low-quality goods. The Signaling models and Screening models respectively explore how to alleviate asymmetric information through signaling and screening mechanisms. Firstly, taking the second-hand car market as an example to explain the lemon problem. In the second-hand car market, sellers have more information about the condition of the car than buyers, and buyers cannot distinguish between high-quality and low-quality cars ("lemon cars"), so

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they can only bid based on the average quality. The result is that high-quality car owners feel that the price is too low and exit the market, leaving more "lemon cars" in the market, ultimately leading to market failure. Secondly, signaling models are used to address the issue of asymmetric information. Signaling models refer to the transmission of quality information from the party with more information to the party with less information through certain verifiable means. For example, in the labor market, job seekers transmit their abilities and qualities to employers through educational certificates, thereby reducing asymmetric information. The other way in which asymmetric information is dealt with is through screening models. Screening is the process whereby the party with less information can induce the party with more information to reveal the true information through the establishment of mechanisms. For example, an insurance company attracts policyholders who differ in their levels of risk by establishing different insurance plans. In this way, the insurer screens out low-risk customers, thus reducing the problem of adverse selection.

1.2. Lending Industry

Asymmetric information is a common phenomenon in the global loan market, and it is of great concern in terms of market effectiveness. Market failure due to asymmetric information is classically referred to as the lemon problem. In the credit market, lenders cannot be fully aware of the credit status of borrowers. High-risk borrowers enter the market, and the quality and trust of overall market participants decrease. For example, studies of Agarwal [1] confirm that in the small and medium firm financing market, due to asymmetric information, companies with weak credit conditions have more chances to get a loan, hence creating the risk of loan defaults.

Secondly, according to signaling models, in the lending market, the party with more information (borrowers) can transmit its true quality to the party with less information (lenders) through certain signals, such as collateral, credit guarantees, etc. For example, Han & Zhang [2] found that in modern Peer-to-Peer (P2P) lending platforms, borrowers can demonstrate their creditworthiness to lenders by providing detailed financial information and social media data to reduce the risk of asymmetric information. For example, according to the studies of Saleemi [3], Alibaba's "Alibaba Finance" analyzes the transaction data of borrowers on its e-commerce platform, and uses big data and machine learning technology to transmit credit information to lenders, thereby improving the accuracy and efficiency of credit decisions.

Finally, screening models proposed by Joseph Stiglitz explain how to alleviate asymmetric information by designing different screening mechanisms. Wang [4] argued that banks can screen out low-risk borrowers by setting different loan conditions and interest rates, thereby reducing adverse selection problems caused by asymmetric information. For example, studies of Tandon & Agarwal [5] have shown that banks can effectively screen out customers with good credit through relationship loans and establishing long-term credit records, thereby reducing default rates.

1.3. Hotel Industry

In the global hotel industry, asymmetric information is also a common problem. Firstly, the lemon problem is manifested in the hotel industry as consumers have difficulty judging the quality of hotel services and the actual condition of rooms, leading to a decline in overall market quality. Hotel operators may exploit asymmetric information to sell inferior rooms or services at prices higher than their actual value. For example, Jayanti [6] pointed out that when booking hotel rooms, consumers often rely only on the information provided by the hotel and cannot truly understand the specific situation of the room, which leads to an increase in low-quality hotel rooms in the market.

Secondly, according to signaling models, hotels convey their credibility and quality by providing high-quality service and positive customer feedback. Elsaid & Sayed [7] studied the role of electronic

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word-of-mouth (eWOM) in hotel management and found that online customer reviews and sentiment analysis can serve as signals of hotel quality, helping potential customers make booking decisions. For example, high ratings and positive customer reviews can effectively convey the high-quality service information of the hotel, attracting more customers to book. In addition, Wynn and Jones [8] pointed out that hotels can better manage and transmit their service quality signals through digital technologies and information systems, such as online review platforms and big data analysis.

Finally, according to screening models, the hotel reservation platform evaluates and filters out high-quality customers and hotels by screening their booking behavior and historical reviews. Chang [9] found that online booking platforms can screen out customers with high loyalty and spending power by analyzing users' search and booking behavior, and recommend more suitable hotels to them. This filtering mechanism not only improves the service quality of the platform, but also helps consumers find hotels that meet their needs more effectively.

1.4. Catering Industry

In the global catering industry, asymmetric information has a profound impact on the investment and operational decisions of enterprises. Firstly, the lemon problem in the catering industry manifests as investors having difficulty accurately evaluating the true value of catering enterprises, leading to a gradual decrease in high-quality enterprises in the market. For example, Gim and Jang [10] studied how asymmetric information affects dividend and investment decisions in catering enterprises. They found that in an environment of asymmetric information, restaurant managers tend to reduce dividend payments, and asymmetric information leads to a decrease in investment efficiency. In such a scenario, high-quality catering businesses may exit the market due to the undervaluation of their value by the market. This relates to the importance of signaling models that are directly applied in the catering industry. Catering enterprises can convey their value information to investors and consumers through public financial information, brand building, and customer reputation management. Gim and Jang added that catering enterprises can communicate their true value to potential investors by providing detailed financial reports and transparent operational data and, therefore, gain more investment. Further information on the quality of the service provided by catering establishments can be obtained from online comments and ratings. This offers further significant signals for investors and helps enterprises spread their reputation and quality into the market.

The application of screening models in the catering industry is also very common. For instance, with due diligence and market analysis, investors will have the chance to screen out catering enterprises with high potential. Zhao et al. [11] stated that screening models for the analysis of financial data and market performance of catering enterprises can effectively identify companies with high investment returns and reduce risks caused by asymmetric information in investment. In addition, catering companies may take advantage of some sort of membership systems, customer loyalty programs, and other means to screen high-value customers and, meanwhile, seek value-added services to maintain and enhance customer satisfaction and loyalty.

2. Data and methods in historical literature

2.1. Lending Industry

The contracting between the borrower and the lender in the lending industry lays a basis for debt, where the borrower promises to return the principal together with required interests at an agreed time in the future. Yan et al. [12] found that other than legal clauses, contracts may be weakened owing to problems regarding asymmetric information. Because asymmetric information is the main difficulty for lenders in reducing default risk, a lot of research will focus mainly on how to alleviate the asymmetric information between borrowers and lenders in the lending process.

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Now, by the signaling models carrying the various methods and information, asymmetric information has been widely alleviated, particularly on the P2P internet lending platform. P2P Internet lending has increased at high speed over the last ten years and is a new major financial service for small and medium-sized enterprises. For example, big data technology largely reduced asymmetric information in the P2P lending industry. As Siering [13] further points out, P2P lending platforms can offer lenders more comprehensive credit information through the use of data from various sources such as transaction records, social media activities, third-party authentication information, etc. This data set is run through machine learning algorithms to come up with credit scores of borrowers, enabling lenders to assess the risk of extending credit more accurately. For example, Alibaba Finance, a subsidiary of Alibaba. Big data collection includes the borrowers' transaction details in Alibaba, Tmall, Taobao, Alibaba, Alipay, and third-party authentication information. That way, Alibaba Finance can readily tap into information on borrowers and the credit they have. The machine-learning algorithm fine-tunes the various weights of the model in real-time, making the analysis more accurate. This is then used to predict the credit risk of a potential borrower and find a potential lender through the Alibaba financial platform.

Lending Club and Prosper are the two largest P2P lending platforms in the US. Among them, Lending Club has developed its credit scoring model and an algorithm called Model Rank, which uses the FICO score of a borrower and credit attributes, application data, and other information to fix the interest rate for the loan. The Prosper creates a Prosper Score, which generates borrowers' credit scores based on variables such as authorization score, income, debt-to-income ratio, total revolving balance, and overdue situation, combined with detailed information provided by borrowers.

Electronic markets significantly reduce the search costs of buyers and the signaling costs of sellers through information systems. In P2P lending, platforms act as intermediaries, utilizing big data technology and information systems to effectively match borrowers and lenders, reducing asymmetric information. Guan [14] found that Lending Club has shortened its loan approval from the common period of 30 days in traditional banks to 5 days and, further, has achieved an improvement of about 15% in the success rate of loans.

Mahalingam [15] also explores the role that the level of education plays in signaling in the online lending market using a study of the platform Prosper. He found out that highly educated borrowers pose a default risk considerably lower than low-educated borrowers. Borrowers with a bachelor's degree or higher had a lower default rate compared to non-university degree holders. Safe defaults, in this regard, would be seen at a lower rate, at 5.2%, as opposed to 9.8%. This proves that educational background can be a very good signal to help the lender pick out a safe one.

2.2. Hotel Industry

Many studies have also concentrated on the information asymmetry in hotel pricing. Hemalatha & Deepeka [16] argue that hotels manipulate the dynamic pricing strategy by using customers' search and preference information. This in turn creates price dispersion and customers would see vastly differing prices when in search of the same hotel. For instance, in Taiwan's hotel market, the prices before and after the pandemic are quite different. Thus, there is asymmetric information. The prices in hotels vary, depending on the dynamic pricing strategies the hotels implement to respond to the shifts in demand. Therefore, dynamic pricing is one way for hotels to manage asymmetric information. The room rates can vary for the hotels based on the real-time market conditions triggered by special events and/or competitor behaviors, as reflected by customer behavior, weather, and supply-demand relationships. For example, as soon as the announcement of a major event or concert has been made, hotels can quickly increase rates for rooms to earn as much revenue as possible. Data shows that, with the use of dynamic pricing, a hotel managed to set the price for rooms at $250 per night during a Taylor Swift concert, compared to the general price of $210. In addition, hotels use big data

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technology to fine-tune the pricing strategy by mining the customers' searches and comments on the booking platform. For example, if a customer searches for a specific landmark or event on platforms such as Booking.com, the hotel system will automatically increase the price of the relevant room, and this dynamic pricing strategy can significantly increase the hotel's revenue.

Signaling models play a central role in the hotel industry, as asymmetric information is particularly prominent among people without hotel experience. Hotels' response to online comments could be a good signal. Li, Cui, and Peng [17] studied the effect of hotel management's response to online comments as a signal transmission based on large-scale field data from TripAdvisor. The study showed that the frequency and speed of response significantly increased traveler engagement, manifested as more comments, higher average valence, more help votes, and higher popularity rankings. Increasing response frequency by 10% can increase customer satisfaction by about 5% and increasing response speed by 10% can increase customer engagement by about 3%. In addition, frequent and rapid responses are more effective for economy hotels (compared to high-end hotels).

Besides, in the hotel industry, signaling models are also widely used in brand and rating systems. According to Wynn and Jones [18], High-star hotels convey their high-quality signals through luxurious facilities and high-quality services, thereby attracting high-end customers. Low-star hotels attract popular customers through affordable prices and basic facilities. Star rating serves as a quality signal to help customers make wiser decisions when booking hotels.

2.3. Catering Industry

In empirical research in the catering industry, regression models are widely used to verify the impact of asymmetric information. By collecting and analyzing financial data, operational data, and market performance of catering enterprises, researchers have established multiple regression models to analyze the impact of asymmetric information on corporate performance. For example, through regression analysis of data from over 700 acquisition cases of catering enterprises, studies found that asymmetric information largely explains the differences in valuation bias and investment efficiency of enterprises.

According to the research of Gim and Jang [19], asymmetric information plays an important role in investment and dividend decisions in the catering industry. They used generalized moment estimation (GMM) and principal component analysis (PCA) to analyze the behavior patterns of catering enterprises in an asymmetric information environment. The research results show that in an environment of asymmetric information, the management of catering enterprises tends to reduce dividend payments, and asymmetric information leads to a decrease in investment efficiency. However, with the improvement of the franchise level of catering enterprises, the low investment efficiency has been alleviated. The specific data indicates that the investment efficiency for franchised catering enterprises is about 15% higher than that of non-franchise enterprises in this research sample. Besides, under the environment of asymmetric information, the dividend payments of the catering enterprises dropped by about 10%. That is to say, asymmetric information seriously influences the financial decision-making and operational performance of catering enterprises.

Another research validated the effect of asymmetric information on corporate acquisitions in the catering industry, and the evidence is the acquisition data. In the research of DiPietro [20], asymmetric information during the acquisition of catering enterprises is substantially high. The literature review conducted for assessing the last decade of studies concluded that asymmetric information is the significant factor causing the failure of acquisitions and valuation bias in catering enterprises. For example, in some related research, it has been verified that the investors overestimate the value of the catering enterprises because of asymmetric information and then they have a big investment loss.

On the other hand, Aureliano Silva et al. [21], by integrating the signal theory and engagement theory, delved into the effect of online reviews on a visiting intention to the restaurant by exploring

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the moderating impact of customer engagement. Online experiments proved that comments with high evaluation and those that emotionally appeal to people would considerably increase the intention of customers to visit the restaurant. The concrete figures are such that for a one-unit increase in comment score, the customers' intent to visit increases by 15%. In the context of low-engagement customers, it has been observed that the positive impact of emotional appeals on visit intention is significantly greater than that of functional appeals.

3. Conclusion

This paper performs analyses on the lending industry, the hotel industry, and the catering industry through a case study of asymmetric information, and reveals the deep and complicated impact of asymmetric information.

First of all, in the lending industry, asymmetric information makes it difficult for lenders to know the credit status of borrowers. So, there is a widespread situation of adverse selection problems and the high default risk. Studies have shown that P2P lending platforms greatly reduce asymmetric information and increase credit evaluation accuracy through big data and machine learning technologies. For example, Alibaba Finance effectively evaluates the credit risk of borrowers and reduces loan default rates by analyzing users' transaction data on e-commerce platforms.

Secondly, in the hotel industry, asymmetric information is mainly manifested as consumers having difficulty judging the quality of hotel services and actual prices, resulting in a large number of low-quality services in the market. Dynamic pricing strategy is an important means for hotels to address asymmetric information, by adjusting room rates in real time to maximize profits. In addition, signaling models are widely used in hotel management, where hotels transmit service quality signals to consumers through online reviews and rating systems, reducing asymmetric information. For example, high ratings and positive customer reviews can effectively convey the high-quality service information of the hotel, attracting more customers to book.

In the catering industry, asymmetric information has a significant impact on investment decisions and the operational efficiency of catering enterprises. Research has shown that in an environment of asymmetric information, the management of catering enterprises tends to reduce dividend payments and investment efficiency decreases. However, by publicly disclosing financial information and brand building, catering enterprises can convey high-quality signals to investors and consumers, reducing the impact of asymmetric information. For example, online comments and ratings can significantly increase consumer visitation intentions and loyalty, thereby improving business performance.

References

[1] *Agarwal, C. (2018) 'Information asymmetry, line of credit and term loan pricing', SSRN Electronic Journal [Preprint]. doi:10.2139/ssrn.3998005.*

[2] *Han, L. and Zhang, S. (2012) 'Asymmetric Information, credit market condition, and Entrepreneurial Finance', Oxford Handbooks Online [Preprint]. doi:10.1093/oxfordhb/9780195391244.013.0012.*

[3] *Saleemi, J. (2023) 'Microblogging perceptive and pricing liquidity: Exploring asymmetric information as a risk determinant of liquidity in the pandemic environments', Economic Analysis Letters [Preprint]. doi:10.58567/eal02010001.*

[4] *Wang, J. (2013) 'Study on loan interest rates risk of commercial banks based on adverse selection', Information Systems and Computing Technology, pp. 149–155. doi:10.1201/b15789-24.*

[5] *Tandon, D. and Agarwal, S. (2010) 'Innovative credit default management in the banks through Credit Default Swaps: An analysis of credit derivatives', SSRN Electronic Journal [Preprint]. doi:10.2139/ssrn.1656792.*

[6] *Jayanti, J. (2023) 'Hotel Guest Rooms', Hotel Housekeeping Management [Preprint]. doi:10.23912/9781911635543-5505.*

[7] *Elsaid, H. and Sayed, M. (2022) 'The impact of electronic word-of-mouth (ewom) on the tourists' purchasing intentions in tourism and hotel sectors', International Academic Journal Faculty of Tourism and Hotel Management, 8(2), pp. 129–153. doi:10.21608/ijaf.2023.132451.1042.*

DOI: 10.54254/2754-1169/2024.17727

[8] Wynn, M. and Jones, P. (2022) 'IT strategy in the hotel industry in the Digital Era', Sustainability, 14(17), p. 10705. doi:10.3390/su141710705.
[9] Chang, S.-C. (2022) '"the effect of interface design and perceived risk of customers' satisfaction and loyalty on online booking application"', Biomedical Journal of Scientific & Technical Research, 46(2). doi:10.26717/bjstr.2022.46.007318.
[10] Gim, J. and Jang, S. (Shawn) (2022) 'Dividend and investment decisions in asymmetric information environments: Evidence from the restaurant industry', International Journal of Contemporary Hospitality Management, 35(5), pp. 1779–1801. doi:10.1108/ijchm-01-2022-0087.
[11] Zhao, L., Li, N. and Wu, Y. (2023) 'Institutional investors' site visits, information asymmetry, and Investment Efficiency', International Review of Financial Analysis, 88, p. 102674. doi:10.1016/j.irfa.2023.102674.
[12] Yan, J., Yu, W. and Zhao, J.L. (2015) 'How signaling and search costs affect information asymmetry in P2P lending: The Economics of Big Data', Financial Innovation, 1(1). doi:10.1186/s40854-015-0018-1.
[13] Siering, M. (2023) 'Peer-to-peer (P2P) lending risk management: Assessing credit risk on social lending platforms using textual factors', ACM Transactions on Management Information Systems, 14(3), pp. 1–19. doi:10.1145/3589003.
[14] Guan, D. (2023) 'Blockchain technology mitigates the role of information asymmetry -- take P2P online lending platforms as an example', Advances in Economics, Management and Political Sciences, 45(1), pp. 239–246. doi:10.54254/2754-1169/45/20230294.
[15] Mahalingam, A. (2020) 'Decision right allocation and platform market effectiveness: Evidence from online P2P lending', Academy of Management Proceedings, 2020(1), p. 18166. doi:10.5465/ambpp.2020.141.
[16] Hemalatha, S. and Deepeka, S.P. (2016) 'Revenue management and dynamic pricing practices at the Gateway Hotel, Chennai', Bonfring International Journal of Industrial Engineering and Management Science, 6(3), pp. 63–66. doi:10.9756/bijiems.8142.
[17] Li, C., Cui, G. and Peng, L. (2017) 'The signaling effect of management response in engaging customers: A study of the hotel industry', Tourism Management, 62, pp. 42–53. doi:10.1016/j.tourman.2017.03.009.
[18] Wynn, M. and Jones, P. (2022) 'IT strategy in the hotel industry in the Digital Era', Sustainability, 14(17), p. 10705. doi:10.3390/su141710705.
[19] Gim, J. and Jang, S. (Shawn) (2022) 'Dividend and investment decisions in asymmetric information environments: Evidence from the restaurant industry', International Journal of Contemporary Hospitality Management, 35(5), pp. 1779–1801. doi:10.1108/ijchm-01-2022-0087.
[20] DiPietro, R. (2017) 'Restaurant and Foodservice Research', International Journal of Contemporary Hospitality Management, 29(4), pp. 1203–1234. doi:10.1108/ijchm-01-2016-0046.
[21] Aureliano-Silva, L., Leung, X. and Spers, E.E. (2021) 'The effect of online reviews on restaurant visit intentions: Applying signaling and involvement theories', Journal of Hospitality and Tourism Technology, 12(4), pp. 672–688. doi:10.1108/jhtt-06-2020-0143.