

Recognition of Price Discrimination in the Online Sale of Airline Tickets

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Abstract. This paper deals with the recognition of price discrimination types in the online sale of tickets by Ukrainian airline companies. A set of technical tools, such as VPN, are used to create different user profiles in order to test several hypotheses on user features, which can make companies set different prices for similar tickets. A set of hypotheses is taken from already existing researches on price discrimination. Moreover, a new hypothesis about price discrimination based on geographical location of a customer will be tested.

Keywords: Price discrimination, dynamic pricing, VPN, airline industry.

1 Introduction

The use of dynamic pricing by companies is not a secret for customers for already many years. Industries that have high fixed costs widely use the approach of dynamic pricing in order to stay profitable. Usually, customers do not perceive this approach negatively, unless it refers to the use of personal information to establish different prices to people based on user profiling. A classic example of an industry that has high fixed costs and uses dynamic pricing on regular basis is the passenger airline industry. Since the costs spend on one flight do not depend much on the number of passengers but on fuel price and airport service costs, airline companies try to sell tickets for the highest possible price corresponding to the current demand. Based on many factors, such as time left to the departure, seasonal demand, the popularity of direction and other, airline companies set prices dynamically, usually the same for all users. Thus, companies provide sales for the highest price, so that the supply of seats in a plane is fully covered. However, many studies have shown that apart from using dynamic pricing synchronically users can become “victims” of the use of personal profiling information. It can be the case of price reduction for a person, who does not want to buy a ticket for its regular price. However, usually, it means that the price can be higher due to a detected ability to pay more.

Current research is dedicated to experimental testing and recognition of personal price discrimination in the online sale of Ukrainian airline companies’ tickets. The main goal of this study is to test several hypotheses on approaches that Ukrainian companies use for dynamic pricing. We want to make an emphasis on the aspects,

which let us make conclusions on the use of personal profiling features while pricing. In case of the presence, we will be able to claim that Ukrainian airline companies do discriminate their customers based on personal features. In order to do so a set of tasks has to be completed:

1. Examine recent studies of dynamic pricing in the airline industry and allocate those examples, which refer to discrimination based on personal characteristics of a customer.
2. Make an overview of dynamic pricing software presented on the market.
3. Select Ukrainian airline companies, which make regular flights, to take part in the research.
4. Suggest some more hypotheses on features, which possibly can cause the use of personal pricing discrimination towards a specific profile.
5. Create fictive user profiles having specific features in order to test whether prices are sensitive to the profile differences.
6. Create experiments specification for testing hypotheses. Collect data on airline ticket prices under different profiles.
7. Analyze results and check different types of hypothesis about profiling features significant for dynamic pricing.

By solving these issues we will be able to detect approaches used by Ukrainian airline industry for dynamic pricing and compare methods with those, recognized in other studies of foreign companies. Thus, a conclusion about the presence or absence of personal price discrimination will be made.

The creation of several user profiles became significantly easier and affordable due to the drop in prices of VPN services. In turn, there is no need for a big amount of different devices or Internet access points in order to simulate "different people". Moreover, this study is the first academic one to deal with the personal dynamic pricing issue for Ukrainian airline companies.

The results of this study will be possible to use by both companies and their customers, however making an opposition between them. After becoming familiar with the results, companies will become aware of the methods their competitors use and those – presented in foreign business models. In their turn, customers will get more information for better decision-making. In case personal discrimination methods are used, they will gain tools to control pricing towards them based on ICT.

2 Personal Price Discrimination and ICT for Dynamic Pricing Strategies Support in Recent Studies

In this part, a review of studies, dedicated to testing of different hypotheses on personal price discrimination, will be made. Such issues as pricing based on days left to the flight or other factors, which is a reason to update prices for all users at a time, will be omitted here since they do not refer to pricing based on profiling. First, some examples of indirect profile discrimination will be given, further, we will move towards direct profile price discrimination.

One of the main price discrimination strategies that are used by companies is a so-called implicit segmentation [1] when the price of a round trip depends on the duration of stay (amount of time between the direct and return flights). This type of discrimination is rather indirect because anyone can check the price for a round trip with a different gap in time. However, from the point of human logic, a short flight seems to be a business trip or other urgent issue, which has to be solved on a specific time, while longer trips are supposed to be leisure ones. And this logic can be used in dynamic pricing algorithm to sell tickets with a higher price. According to [1], a price difference of 50% could have been observed for KLM company tickets prices in favor of long-term travelers compared to short-term.

Another example of indirect price discrimination is higher ticket prices for those, who scan websites on weekends rather than on working days. According to [17], people were offered in average 5% lower prices on weekends compared to working days. "This conjecture is supported by the finding that the weekend purchase effect is distinctly larger on routes with a mixture of both business and leisure customers than on routes that disproportionately serve leisure customers" [17].

One of the most popular and used for a long time approaches in dynamic pricing is a Saturday-night stay-over requirement for price discrimination. Concerning, that business trips usually take place on working days and busy people want to get home before the following weekend, there is a usual assumption that busy people do not leave for weekends, while those who have holiday trips can stay on weekends. Since the second group has a lower elasticity of demand, it is frequently offered tickets for lower prices. The research [20] showed a negative significant correlation between price of tickets and cases of covering weekend days during a trip. The very same result of a significant drop in price for Saturday-night stay-over trips was shown in the research [10].

Now let us move to the cases and assumptions of direct personal price discrimination in the sale of airline tickets. The research [6] concludes that customer browsing history and behavior on Internet causes price differences from one profile to another. An earlier study emphasized that customers are aware of the fact that their Internet profile can be used for dynamic pricing and individual price targeting [2]. Moreover, another study [11] showed that customers feel treated more fairly when they are offered different prices based on purchase characteristics rather than on their behavior and browser cookies history.

One of the features that can be taken from the browser cookies is whether a user has previously visited a mediator website in order to find suitable fares. If so, then a further direct visit to a company website can be impacted by the previous action. The fact of possible price change in the airline industry was not checked itself, however, the research about pricing on the Internet [8] showed, that such a strategy is widely used in e-commerce and online sales. The hypothesis to check in this research is a decrease in a price of tickets after visiting a mediator website.

Here is the list of top discrimination types detected by researchers at different studies referring to airline tickets sale and pricing on the Internet. All these direct and indirect types of discrimination by the user profiling will be tested in the main part of this paper on Ukrainian airline companies.

Now let us consider those technologies standing behind dynamic pricing strategies. The need for dynamic pricing is not a whim of companies. It has become the norm for many service industries – especially in today’s volatile markets. Due to the intensification of competition in the markets, companies should care about a proper pricing strategy. Information now is more available than ever before, that is why an average customer became significantly aware of prices on market, competitive advantages of companies. “How you price your product could make or break your business. Price too high and you’ll likely lose to the competition. Price too low and you’ll degrade the value of your goods and services. Price just right, and you’ve put yourself in prime position to win the sale. Bottom line: you need a strong, sound, and proactive strategy to come out on top” [13].

The main reason for the rapid development of pricing strategies its and continuing improvement is the new sources of information. “Technological advancements are giving airlines access to more information about the characteristics of their customers” [4]. Implementation of a dynamic pricing strategy and revenue optimization in today’s information world is gained by the use of up-to-date ICTs, recent methods of artificial intelligence, such as neural networks and reinforcement learning, and nature-oriented optimization methods, such as genetic algorithms and simulated annealing. These methods are being developed constantly and specialists apply them to allocation processes in distributed IT-infrastructures, or grid systems [7, 16, 19].

Currently, several dozens of specialized software, both web-based and desktop, can be found. These products provide a different kind of analytics in addition to pricing strategies. They are channel analysis, competitor product analysis, market analysis, pricing analytics etc. According to Captterra ranking of the highest rated products,¹ the top three dynamic pricing software products are Prisync, Seller Republic, and Skuuudle. Another ranking set by G2 Crowd gives first three places to aPriori, EndeavorCPQ, Verenia CPQ. If we consider a company's size, the best products for big enterprises are KBMax3D CPQ, aPriori Product Cost Management, and Zilliant IQ. For mid-market companies, G2 Crowd recommends EndeavorCPQ, Verenia CPQ and KBMax3D CPQ. EndeavorCPQ is proposed for small business as well.²

According to the interview with 7 dynamic pricing software specialists on Quora, it is obvious that the use of simple business rules without analysis of specific data is a poor game. All of them agree with the opinion that big data needed for machine learning and deriving pricing rules is the core of an effective strategy. They also make an emphasis on the need for quality data that should be used for learning, since the effectiveness of pricing highly correlates with it. However, a reasonable approach for choosing software products was proposed by a pricing consultant Kapil Muley. He insists on building custom models for any kind of company in order to correspond to the specifics of the company industry.³

¹ https://www.capterra.com/pricing-optimization-software/?utf8=%E2%9C%93&users=&sort_options=Highest+Rated

² <https://www.g2crowd.com/categories/pricing>

³ <https://www.quora.com/What-is-the-best-software-for-fully-automated-dynamic-pricing-in-e-commerce>

3 Ukrainian Passenger Airline Industry

In this part, we are going to make a review of Ukrainian companies, which carry out regular passenger flights. Today only 4 airline companies deal with regular flights and have their own Internet platforms for selling tickets online. After "Aerosvit" company went bankrupt in 2012, "Ukrainian International Airlines" became an actual monopoly-company and still being so far. Here is the list of companies whose pricing approaches will be analyzed in this work:

1. Ukrainian International Airlines – a strategic Ukrainian company, which carries out most of the international flights from Ukraine. The company is based at Boryspil International Airport. "Ukraine International offers a vast selection of point-to-point and transit travel opportunities. The airline connects Ukraine with 38 countries in Europe, Asia, America, Africa, and the Middle East. The carrier operates 1100 international and domestic flights weekly and provides connections with partner airlines' services to over 3000 destinations worldwide"⁴.

2. "Motor Sich Airlines" – a unit of the Public Joint Stock Company Motor Sich, a successful and leading company, which develops and manufactures aircraft and helicopter engines. The company is based in Zaporizhzhya International Airport. "Nowadays the Airline has a fleet of nine aircrafts, operating regular passenger domestic and international flights, passenger and cargo charter flights and special flights, ensuring operation of the parent company"⁵.

3. "Atlasjet" – a subsidiary company of Turkish "Atlasglobal", was licensed only a few years ago, in 2015. "Atlasglobal performs regular international flights from Lvov, Kharkov, and Zaporozhye to Ataturk airport in Istanbul, from Istanbul – to the cities of Turkey, Northern Cyprus, Europe, Russia, Caucasus, Central Asia and the Middle East".⁶ Ukrainian subsidiary is based in Lviv Danylo Halytskyi International Airport.

4. "Yanair" – another young airline company, based in Kyiv International Airport (Zhuliany). The company carries out both regular and charter flights, the regular ones have destinations in Georgia and Israel. Apart from passenger air travel, the company implements an investment program into Zhytomyr Airport.⁷

It is worth noting that the companies mentioned above have a very different market position, since "Ukraine International Airlines" seems to be a monopoly-company and has the biggest market share. Formally, the company is not recognized as a monopolist in Ukraine, since "market" in the airline industry is defined as the set of flights on the respective route. Thus, formally a monopolist should occupy all the routes from the country. According to the Ministry of Infrastructure of Ukraine, the number of transported passengers by "Ukraine International Airlines" during the first three quarters in 2017 was 20% higher than during the similar period in 2016.⁸ "Ukraine International Airlines" has overall transported nearly 7 million of passengers during the

⁴ <https://www.flyuia.com/ua/en/about/uia-about>

⁵ <https://www.flymotorsich.com/en/pages/company>

⁶ <http://www.atlasglb.com.ua/about-us/>

⁷ <http://yanair.ua/company.html>

⁸ <https://mtu.gov.ua/content/statistichni-dani-v-galuzi-aviatransportu.html>

previous year,⁹ which is about 68% of 10.55 million people transported by Ukrainian airline companies in 2017.¹⁰ Considering this, we percept “Ukraine International Airlines” as a monopolist of the industry.

4 User Profile Simulation and Significant Features Detection Methodology

This part contains specifications of several experiments conducted in the framework of this study. In general, we expect to recognize some cases of the third-degree price discrimination, which implies customer segmentation in order to sell tickets for different prices. The worst possible case we should expect to recognize is the first-degree price discrimination, which means selling tickets for the highest acceptable by a certain customer price. However, only a monopolist can afford using such technique for pricing. First of all, let us define the hypotheses we want to test. Besides what was mentioned in the previous studies part, there are several more hypotheses to add, which mostly refer to personal profiling features of a user. Here is the final list of ten hypotheses to check (Table 1), including an explanation of why these features are important to test. Assumptions on the possible impact of these features on tickets’ price can be found as well.

Table 1. Hypotheses on user features, which can be used for discrimination while dynamic pricing

#	Discriminated feature	Direct or indirect discrimination type	Why this feature is important	Hypotheses to test
1	Saturday-night stay-over	Indirect	Business trips, which are more price elastic, are not supposed to occur on weekends	Round trips that overlap weekend days are cheaper

⁹ <https://www.flyuia.com/ua/ua/news/2018/uia-performace>

¹⁰ http://cfts.org.ua/news/2018/01/16/ukrainskie_aviakompanii_uvelichili_passazhiropotok_na_275_v_2017_godu_45009

#	Discriminated feature	Direct or indirect discrimination type	Why this feature is important	Hypotheses to test
2	A user has previously booked a hotel	Direct	Since a person has some fixed plans, he or she is less price sensitive	Round trip is more expensive after a hotel has been booked
3	Geographic location	Direct	People from all over the world have different financial opportunities, proportional to the incomes of the country's population	Users from developed countries will be offered higher prices than those from developing ones
4	Cookies and general search history left in a browser	Direct	Since a company can reconstruct more precise profiles of people, they will be offered prices fitting their behavior	Depending on the browser history, people can be offered both lower or higher prices compared to „cold“ (newcomers without information collected) users
5	Other company same direction previous search	Direct	A company can vary prices depending on the knowledge of a user about prices offered by competitors	Depending on the prices offered by previous search result of the same direction, cross-price elasticity may vary
6	Previous unfinished attempt to buy tickets	Direct	A company can create an impression of urgency to make a quick decision before prices have changed again	Prices increase after an unfinished attempt to buy tickets
7	Duration of the stay	Indirect	Business travelers, who are less price sensitive, and leisure travelers differ in the length of a trip	The longer the round trip – the less is the price

#	Discriminated feature	Direct or indirect discrimination type	Why this feature is important	Hypotheses to test
8	Day of week to purchase tickets	Indirect	People who buy tickets on weekends are more price sensitive	Prices go lower on weekends
9	Direct website visit or previous mediator website visit	Direct	Companies create a feeling of urgency to buy a ticket on a direct website since price here is lower	Companies can offer a lower price than the very same company's route on the mediator website
10	Device type	Direct	The type of device a person uses correlates with financial opportunities	Customers browsing the internet from expensive devices will be offered higher prices

An approach used in this study for testing hypotheses includes creating several fictive user profiles and conducting A/B testing. An important condition for correct calculations is to isolate the impact of other user factors for each tested feature. Hypotheses about indirect price discrimination types do not need A/B testing since they are not supposed to depend on user profiling features.

For this study, several fictive customer profiles were created. This is possible due to the use of virtual private network (VPN) service, namely IVPN,¹¹ that gives an opportunity to go to a website using a mediator server. Thus 6 different browsers on different devices were used, plus servers around the world mediated them. Here is the list of profiles used for the experiment:

Table 2. Devices used for the experiment

#	Browser	Cookies history	Servers	Platform
1	Mozilla	Cleared	Paris, Toronto, Hong Kong	Windows
2	Google Chrome	Cleared	Madrid	OS X
3	Safari	Not cleared	-	iOS
4	Safari	Not cleared	Bucharest	OS X
5	Google Chrome	Not cleared	Milan	Windows
6	Google Chrome	Cleared	Frankfurt	iOS

¹¹ <https://www.ivpn.net/>

Now we need to specify experiments for testing hypotheses from Table 1. It is important to make sure that metrics in the A/B test are isolated from the impact of other factors (or at least this impact is not significant).

Table 3. Experiments specification and explanation

Exp. #, name	Control metric	Platform, browser, server	Test metric	Platform, browser, server
1. Saturday-night stay-over	Round trip price (trip does not weekend) divided by the sum of one-way component flights	Windows Mozilla No cookies Paris	Round trip price (trip includes weekend) divided by the sum of one-way component flights	Windows Mozilla No cookies Paris
2. Previously booked a hotel	Round trip before booking a hotel	Windows Mozilla No cookies Paris	Round trip after booking a hotel	Windows Chrome Cookies Milan
3. Geographic location	One way trip	Windows Mozilla No cookies Paris	One way trip from other servers	Windows Mozilla No cookies Toronto & Hong Kong
4. Cookies and general search history left in a browser	One way trip	iOS Chrome No cookies Frankfurt	One way trip	iOS Safari Cookies Kiev
5. Other company same direction previous search	One way trip	iOS Chrome No cookies Frankfurt	Check same direction price on different airline company website, then check the one-way trip price	iOS Safari Cookies Kiev
6. Previous unfinished attempt to buy tickets	Roundtrip	OS X Safari Cookies Bucharest	Round trip, after previous attempt to book on the same device	OS X Safari Cookies Bucharest

Exp. #, name	Control metric	Platform, browser, server	Test metric	Platform, browser, server
7. Duration of the stay	3 pairs of separate round-trip flight components, try three different timeframes: up to 3 days, nearly a week, more than 10 days	Windows Mozilla No cookies Paris	Round trip, try three different timeframes: up to 3 days, nearly a week, more than 10 days. Check the sum divided by the sum of one-way component flights	Windows Mozilla No cookies Paris
8. Day of week to purchase tickets	Round trip price on a working day	Windows Mozilla No cookies Paris	The same round trip price on the weekend, then again on working day	Windows Mozilla No cookies Paris
9. Direct website visit or previous mediator website visit	One way trip	iOS Chrome No cookies Frankfurt	Check same direction price on mediator website, then check the price on the direct website	iOS Safari Cookies Kiev
10. Device type (platform)	Roundtrip	Windows Mozilla No cookies Paris	Compare with the same search on other devices	iOS / OS X No cookies

Let us bring some understanding of testing hypotheses about indirect price discrimination. As it was shown in the specification of #1 experiment about Saturday-night stay-over, we aim to check, how price of the round trip differs from the total price of two separate tickets as if they were bought separately. For example, as for January 17th, the price of the race Kyiv-Vienna conducting on February 6th by Ukraine International Airlines was 6439 UAH. The return flight from Vienna to Kyiv on February 9th cost 7073 UAH. However, if we buy the respective round trip in one cheque, the two tickets would cost 7256 UAH, meaning, that the discount for buying them is around 46%.

While collecting routes data for the statistics, we tried to select quite similar trips. In the case of experiment # 1, the round trips compared should have the same time of stay and nearly the same price. This can prevent from the impact of undesirable factors on the experiments.

5 Results and Discussions

During this research, we have collected 920 flight price observations (later grouped into 400 test cases), established by Ukrainian airline companies. These were both one-way ticket prices and round-trip prices. For the purpose of creating 6 different fictive profiles, we have used only 2 devices: iPhone 6s and MacBook Pro Retina 2015.

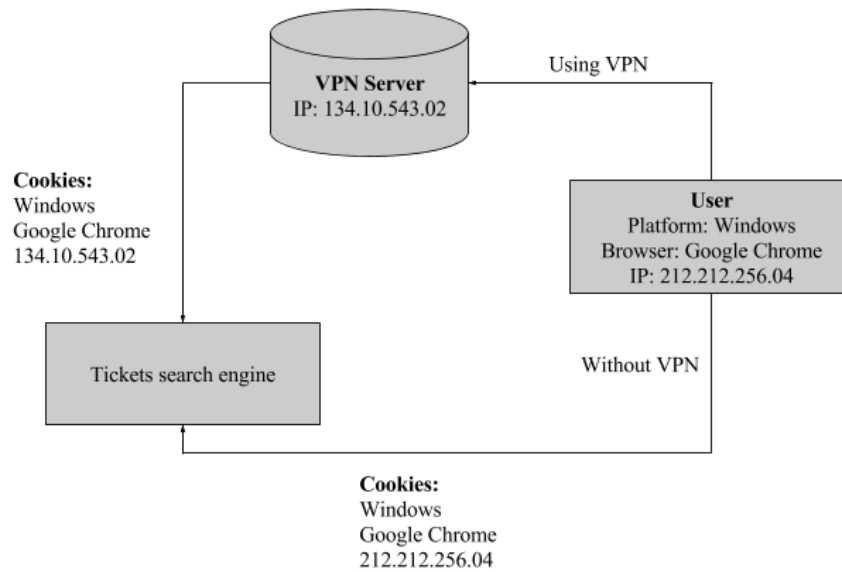


Fig. 1. A scheme of changing IP address in cookies while using VPN.

A virtual Windows machine was created on Macbook using VirtualBox and official 3-month trial Windows distributive for virtual machines. Thanks to the use of IVPN service we could use 6 different servers from cities of different continents (Paris, Madrid, Frankfurt, Milan, Hong Kong, Toronto) to use IP addresses, which helped with imitating 6 different people. In Figure 1 a scheme with an example of VPN service use is explained.

After collecting data, which might theoretically belong to different people, we analyzed the results in order to recognize those cases, which prove the use of price discrimination based on indirect factors and direct user profile features. The results are presented in Table 4. By “proving” cases we mean those ones that can be associated with a certain hypothesis acceptance, while “neutral” cases – with rejection.

Table 4. Experiments' specification and explanation

Company	Hypothesis tested	# of proving cases	# of neutral cases
Ukraine International Airlines	1. Saturday-night stay-over	5	5
	2. Previously booked a hotel	1	9
	3. Geographic location	0	10
	4. Cookies and general search history left in a browser	0	10
	5. Other company same direction previous search	0	10
	6. Previous unfinished attempt to buy tickets	0	10
	7. Duration of the stay	3	7
	8. Day of week to purchase tickets	0	10
	9. Direct website visit or previous mediator website visit	0	10
	10. Device type (platform)	0	10
Motor Sich Airlines	1. Saturday-night stay-over	2	8
	2. Previously booked a hotel	0	10
	3. Geographic location	0	10
	4. Cookies and general search history left in a browser	0	10
	5. Other company same direction previous search	0	10
	6. Previous unfinished attempt to buy tickets	0	10
	7. Duration of the stay	4	6
	8. Day of week to purchase tickets	1	9
	9. Direct website visit or previous mediator website visit	0	10
	10. Device type (platform)	0	10
Atlasjet	1. Saturday-night stay-over	6	4
	2. Previously booked a hotel	0	10
	3. Geographic location	0	10
	4. Cookies and general search history left in a browser	0	10
	5. Other company same direction previous search	0	10
	6. Previous unfinished attempt to buy tickets	0	10
	7. Duration of the stay	5	5
	8. Day of week to purchase tickets	0	10

Company	Hypothesis tested	# of proving cases	# of neutral cases
Atlasjet	9. Direct website visit or previous mediator website visit	0	10
	10. Device type (platform)	0	10
Yanair	1. Saturday-night stay-over	0	10
	2. Previously booked a hotel	0	10
	3. Geographic location	0	10
	4. Cookies and general search history left in a browser	0	10
	5. Other company same direction previous search	0	10
	6. Previous unfinished attempt to buy tickets	0	10
	7. Duration of the stay	3	7
	8. Day of week to purchase tickets	0	10
	9. Direct website visit or previous mediator website visit	0	10
	10. Device type (platform)	0	10

Concluding from the results, reflected in Table 4, we cannot prove any kind of direct personal discrimination by Ukrainian companies while selling tickets online. This means, that our possible beliefs about airline companies (at least in Ukraine), who might use our personal information to manipulate prices, are groundless. Another situation we have with indirect personal price discrimination. We saw some cases when a price for the round trip can vary depending on Saturday-night stay-over and the length of a trip planned. However, these experiments can have other impacting factors, which were not taken into consideration. For example, it seems that prices are less likely to have big discounts for round trips as soon as time till departure decreases.

It is worth noting, that the results on direct discrimination type are quite significant to consider them as the disapproval of personal price discrimination used by Ukrainian airline companies.

6 Conclusions

The conducted research leads to several conclusions. The first and the most important conclusion refers to the issue of personal price discrimination while selling tickets by airline companies. No significant proves of using personal information from cookies by Ukrainian airline companies have been found. Moreover, one of the provoking hypotheses that geographic location of a customer has an impact on tickets price was refuted. This entails the next set of conclusions for online tickets sale by Ukrainian airline companies:

- Previous browsing history of a user has no evidence of influencing ticket prices.
- The fact, that a user has already booked a hotel, does not affect the trip price.
- Geographic location of a user does not influence ticket prices.
- A fact that a user has checked competitors' prices on the same route has no impact on ticket prices, the same with mediator websites.
- Previous unfinished attempt to book tickets does not entail price increase.
- The type of device a customer uses to check ticket prices does not affect prices themselves.

Another piece of conclusions made during the research is that there is no direct evidence of using price discrimination based on so-called "indirect" user profile features, such as duration of stay, week of purchase and Saturday-night stay-over effect. However, these hypotheses need further research in case of interest towards these issues.

In this study, the authors have shown, how available tools can be used for checking price discrimination hypotheses for any kind of online sale platform. The main idea of this method is that VPN services can be used to create fictive user profiles. What is most important is that they would differ by IP address and geographic location respectively.

Several recommendations for customers to avoid price discrimination can be made based on the research and previous studies in the field. Browsing history and Internet footprint can be used for establishing prices dynamically based on browser cookies. It is reasonable to check the same item price from a browser with cookies used, and from a clear browser as well. It will not be superfluous to analyze your previous actions in a browser and how they can affect prices. Also, VPN services can be used for browsing websites as a specific country's resident. The authors of this work call customers for smart use of browser cookies and private browsing.

On the other hand, price discrimination is an approach for companies to expand markets and make extra profits. Using up-to-date information technologies is an opportunity for new selling approaches and dynamic pricing in general. Companies are getting new opportunities for wider price diversification and more effective extraction of customer surplus. This became possible due to the use of ICT for studying consumer preferences and behavior.

The absence of price discrimination detected while studying Ukrainian airline companies is not an unequivocal indicator of ethics. It rather shows that the companies are lacking ICT tools for dynamic pricing, which are unlikely used often in online pricing worldwide.

Thus, an important factor for increasing Ukrainian companies' competitiveness is their ability for discovering and using knowledge from all possible sources of information. Using dynamic pricing strategy is not a new concept, however still being possible with enough data and technologies. That is why Ukrainian airline companies should use a broader range of ICT in order to keep being competitive and increase efficiency.

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