

The Bank's Strategy in Online Banking Prices

by

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Abstract. The online payments market is growing faster and faster worldwide, facilitating the fast and conveniently obtain of products and services from nearly any field. For the last 10 years, banks worldwide have begun seriously investing in online services. The banking market from Romania has not yet reached a maturity that allows massive migration to online, but the phenomenon began for several years to be felt. This article presents the way that banks should calculate the prices for online banking services in relation to their strategies and the number of customers. We will also address a comparative online banking market analysis for United States and Romania. The models applied in the comparative study will be based on game theory. The fact is that big banks choose to invest more in internet banking for profit and they have bigger fees to their customers, when the smaller banks are investing in this kind of service for increasing market share, with small or no fee at all.

Keywords: internet banking, game theory, banking fees, prices

JEL classification: C7, D7, G2

1 Introduction

The internet banking has changed the banking industry faster than any other service. Worldwide, the banks had to shift their business strategies in order to benefit by the online opportunities. Internet banking has opened a new frontier, allowing the banks to overcome their limits.

In this study, we will determine the fees that banks should have with their clients, based on game theory methods.

The internet banking implementation represents a strategic problem for most of the banks. Also called "click and mortar", this banking model completes the classic banking based on branches and competes with the "pure internet banks". This last banking system it can be found only on the US market.

Along with the increasing internet usage, the banks have switched the attention more and more for creating alternatives to the classic branches. Thus, the banks have started to use the online medium not just to increase the customer's comfort and as a payment method, but also for reducing costs and increasing profits. Fierce competition among worldwide banks has forced them to find new profitable areas to expand. Thereby, the internet banking

services have represented a viable strategy for both old players from the banking market and the new ones.

The online banking portals may be implemented using two business models.

The first model aims to increase the number of clients by selling banking products on internet and to ensure safe transactions on secure transactional websites. This model was adopted in United States, since 2002, by a huge number of banks (about 50%).

There is another business model for internet banking: the pure internet bank. This kind of bank does not need branches in order to support its business. Just few banks have adopted this strategy but only some of them have managed to survive, by merging with other companies or also by opening physical branches. Few of this kind of US banks have managed to survive and obtain profit and these ones are considered to be innovative banks.

In this study we have analysed the behaviour of the first 10 banks from Romania (by market share), in comparison with the actions undertaken by banks from an extremely developed market in this direction. Both banks with majority domestic capital and foreign-owned ones embrace the US business model but

a developing country market can adopt the same models?

In developing countries like Romania, the online banking services are still at the beginning, the consumer's concerns for using these services take a toll in the adoption of them by the banks in the market.

The uncertainty on the demand of the internet banking services is an important factor on determining the business strategy that banks have, especially in setting the price that customers will pay for the service.

In terms of internet banking services, the consumers are responding differently depending on the perceived usefulness, ease of use and also the reluctance to also change the individual characteristics of each. The consumer's individual characteristics are differently represented by age, sex, marital status, occupation and education among others.

The reluctance to change represents an important aspect of Romanian consumer to new technologies or products on the market. This reluctance appears from several factors: the lack or limited internet access, the high costs of a computer and internet service. But the most important factor remains the lack of internet knowledge, the banking informatics security mainframe systems but also the lack of confidence in the banking system.

These factors are well grounded in Romanian consciousness.

The specialty studies try to evaluate the internet banks performance. Almost all the studies refer at the banking system of USA. Sullivan (2000) supports the idea that the traditional banks are not affected by the adoption of internet as a distribution channel.

In the study "Internet Banking Profit Seen Harder For Small Banks", Deborah Bach (2000) answered to an important banking problem: "Is the internet banking profitable?". The answer is yes, but there are a series of restrictions in terms of small banks and those that are not mastering the "cross-selling" online sales. From this study has been revealed that the banks that have between 30,000 and 40,000 clients usually achieve a return on initial investment in internet banking, more than 60%.

In this paper I have analysed what is the optimum price that customers should pay for internet banking services in two situations: complete information dynamic game oligopoly and the situation when a group of banks are making a cartel.

The obtained results show that the costs that consumers have to pay is too high compared with the effort that banks are doing for the development of these services. This is confirmed by the analysis realized on the US market, in the study of Deborah Bach (2000).

Also it was demonstrated that banks with small market share prefer to not take a fee for the users of banking services but offer the online banking benefits together with a simple account opening.

The paper is structured as follows: section 2 reviews the literature on internet banking while section 3 presents the theoretical model of Bertrand dynamic oligopoly. Section 4 discusses the data and the results. Section 5 presents the theoretical model for a cartel situation while section 6 reveals the findings and finally concludes in section 7.

2 Literature survey

This paper offers a good view on the differences between online banking services from two very different markets: USA - a big developed country and Romania - a small developing country.

In "Strategic Online-Banking Adoption" (2010) study, Rubén Hernández-Murillo talks about the US online banking market, how banks reduces the costs by using this technology and how the competition have a major role in the process of adoption. The study uses geographical data and market share in order to establish how internet banking is adopted by the banks, along with other determinants like the competition. The information used in this initial research dates from 2002-2006 period.

"Investment in internet banking as a real option: theory and tests" (2002) by Marsha Courchane draws attention to the behavior that some banks have in terms of investment in online banking services. The authors analyze the behavior of a reference bank, that is strategically 'large'

relative to its rivals and competitors. The reference bank will invest in the first period, when there will be a high degree of uncertainty of customer demand, while the rest of the banks will choose to invest in the second period. Therefore, the smaller banks will benefit of the know-how that exists in the market and a greater openness from the clients. Based on statistics of the investment strategy, demand and competition, this study reveals how banks have adopted the internet banking. As a consequence, larger banks can afford to invest in internet banking services earlier than smaller banks.

Furst and al. (2002) has developed a statistical model for explaining why banks chose to adopt the internet banking and why it differentiates the range of products offered online. Also the authors have investigated the effect that online banking adoption it has on the profitability. Thus, it was demonstrated that the profitability of the national banks from US is strongly related with the online banking service. The big banks were the first in the internet banking adoption. These banks were situated in urban areas and most of them have being part of a group. The business strategy of these banks was used aggressively for market share gain and not for the profit. The study shows the non-existence of a relationship between the return and the electronic payment service, but this can be attributed to the sample taken into account for the request estimation.

We have also used a GFK study that reveals the fact that only 4% of the Romanian people that have bank accounts are using internet banking. This number is very small in comparison with the majority of the countries from Europe. One reason for this low percent of Romanian people that are using the online banking may be because of the low Internet penetration rate in this region, low level of acquaintance and the people's fear of online transactions. The study is based on banking statistics from Central and Eastern Europe countries.

Statistics and mathematical methods helps us to see the differences but most important the similarities between two very different markets that are using the same technology at the same moment.

3 Bertrand dynamic oligopoly

In this study it was used the game theory in order to have an overview of what is happening on the online banking market.

The game theory creates the possibility to analyze the others decisions impact on the own decisions and the corresponding results.

Considering the aspects that characterize the Romanian financial/ banking market, we can observe that it has the characteristics of an oligopoly market.

The players behavior from the market can be modeled with the help of a dynamic game that catches the Bertrand oligopoly in complete information conditions.

Bertrand competition is used in economics as a model of competition. It is named after Joseph Louis Francois Bertrand (1822-1900) and describes the interactions among firms (sellers) that are setting the prices and their customers (buyers) that choose quantities at that price.

The assumptions of this model are:

- at least 2 firms that produces very similar products (homogeneous);
- the firms do not cooperate;
- the firms are competing by setting simultaneously the prices.

The consumers are buying from the firm with the lower price. If all firms have the same price than the consumers will randomly select among them.

We will take into account the actions taken by the first 10 banks (by the 2011 market share).

Each banking institution will act to supply or not the internet banking services. Thus, each one proposes a fee for the provided homogeneous service. The q_i demand of the internet banking service provided by the banking institution i it has the form

$$q_i = 3 \cdot 10^8 \cdot \theta - 10p_i + \sum_{j \neq i} p_j, i = \overline{1,10} \quad (1)$$

(the demand on that uncertainty factor depends)

, where p_j is the fee / price announced by the j bank.

The IB service average cost, for all 10 banks, it is considered to be equals with c .

Thus, the profit formula for the banking institution i , in relation to the rest of the player's prices, it has the form:

$$\pi_i(p_i, p_j) = (p_i - c)q_i = (p_i - c) \left(3 \cdot 10^6 \cdot \theta - 10p_i + \sum_{j=1}^{10} p_j \right) \quad (2)$$

In these conditions, the prices associated to the Nash equilibrium will be determined as a result of profit maximization, each player acting rationally:

$$p_i \geq c$$

$$\max_{p_i} \pi_i(p_i, p_j), i = \overline{1, 10} \quad (3)$$

Under 1st order conditions we have:

$$\frac{\partial \pi_i}{\partial p_i} = 0, \quad \text{where } 3 \cdot 10^6 \cdot \theta - 20p_i + \sum_{j=1}^{10} p_j + 10c = 0 \quad (4)$$

The 2nd order conditions assures us on the existence of a maximum point:

$$\frac{\partial^2 \pi_i}{\partial p_i^2} = -20 < 0$$

From the first optimum condition we will identify the service price given by each banking institution, for a complete information game condition.

$$p_i = \frac{3 \cdot 10^6 \cdot \theta + \sum_{j=1}^{10} p_j + 10c}{20} =$$

$$= \frac{3 \cdot 10^6 \cdot \theta + 10c}{20} + \frac{\sum_{j=1}^{10} p_j}{20}$$

$$\begin{cases} 20p_1 = p_2 + p_3 + p_4 + p_5 + \dots + p_{10} + 3 \cdot 10^5 \cdot \theta + 10c & (5) \\ \vdots \\ 20p_{10} = p_1 + p_2 + p_3 + p_4 + \dots + p_{10} + 3 \cdot 10^5 \cdot \theta + 10c & (15) \end{cases}$$

By computing the difference between the first two equations we will get:

$$(5) - (6) \Rightarrow 20p_1 - 20p_2 = p_2 - p_1 \Rightarrow 21p_1 = 21p_2,$$

And the results are: $p_1 = p_2$.

By having a symmetric system, we will get the same solutions: $p_1 = p_2 = \dots = p_{10}$. So, the price for the internet banking services offered by the 10 banks taken into consideration will be the same and will have the next value:

$$p = \frac{3 \cdot 10^6 \cdot \theta + 10c}{11}, \forall i = \overline{1, 10} \quad (6)$$

Under some rational players $p_i > c$,

$$\frac{3 \cdot 10^6 \cdot \theta + 10c}{11} > c \Rightarrow 3 \cdot 10^6 \cdot \theta + 10c > 11c$$

$$\Rightarrow 3 \cdot 10^6 \cdot \theta > c$$

The request is given by:

$$q(\theta) = \frac{3 \cdot 10^6 \cdot \theta - 10c}{11} \quad (7)$$

The profit of each bank is given by:

$$\pi_i(p_i, p_j) = \pi_i(p) = \frac{10}{121} (3 \cdot 10^6 \cdot \theta - c)^2 \quad (8)$$

Next I will use this economic model in order to find the optimum price for internet banking services. Also we will see a comparison between the calculated optimum and the real price.

3.1 Data and results

According to the Romanian National Bank reports, today there are 33 commercial banks that exercise the activity, with total actives of 341150 millions lei and 9 foreign banks branches, with total actives of 23679.1 millions lei.

The banking system structure situation at the end of 2010, for the social capital nature, was the following: 2 banks with whole capital or state majority (CEC Bank and Eximbank), 4 banks with majority private capital (Transilvania Bank, Carpatica Commercial Bank, Libra Internet Bank and Feroviar Commercial Bank), 26 with majority foreign capital, 9 foreign banks branches and one authorized loan cooperative organization (Central Cooperative Bank CREDITCOOP).

We will take into account the actions taken by the first 10 banks (by the 2011 market share).

The top first 10 banks by actives value is not the same with the ranking of first 10 banks by payment value with internet banking made in 2011 by physical persons.

By analysing the two rankings presented in Table 1 and Table 2, from data appendix, it can be observed a ranking rollover: the 10th bank by market share becomes the first bank by the value of the payments made with online banking services. Also it can be seen the appearance of new players in the second ranking.

In order to determine the optimal fee that a customer of internet banking services should pay, we consider the average development cost value as equal to 280,000 Euros. The average

cost was calculated knowing that: one year is required for the development, the average cost of the platform that is used to support the development of the service, as equal to 40,000 Euros, and the average cost per employee (2000 euro to 10 employees). Also we have considered $\theta = 10^{-1}$.

Thus, the optimal price given by one of the ten banking institutions considered has the following value:

$$p = \frac{3 * 10^6 * \theta + 10 * 280000}{11}, \forall i = \overline{1,10}$$

$$p \approx 281.818,18 \text{ euro}$$

The Romanian Commercial Bank is the bank with the largest number of users of internet banking: 700,000 customers in 2011 and also the first bank by the assets held in 2010.

Using this data and the above model, the optimal fee that each customer of this bank should pay monthly to access the application is 0,0335 euro (0,0011 lei).

The current price taken for internet banking by Romanian Commercial Bank (24Banking) is 3 lei / month which is a fee 2665 times higher than the optimal fee.

Also the second player from the market, by number of internet banking customers, charge 20 times more than the fee balance: 0,0456 euro (0,1997 lei).

Instead the small players in the Romanian banking market do not charge a monthly fee for Internet banking service. Their strategy is totally different from the strategy of large players: they seek to gain market share by providing innovative services without charging the same inflated commissions. This phenomenon can be seen clearly on the banking market in Romania by analyzing some players with low market share: Volksbank Romania (5.8%), Libra Internet Bank (0.2%).

4 The banking cartel on the online banking market

As the *Explanatory Dictionary of Romanian* says, the cartel represents "Monopolistic union where several production companies from the same industry conclude an agreement, are

setting the prices, sales and supply conditions, payment terms, the quantity of goods that will be produced by each and the share markets in order to limit or eliminate competition."

Over time, banks from Romania and abroad were involved in such organizations. In 2011 was discussed the possibility of a cartel formed by giants of the banking world: Bank of America, Citigroup and UBS. US investigators examined the possibility that some of the giants of the banking industry have formed a cartel to manipulate Libor, one of the most important reference rates in the banking sector before and during the financial crisis, according to sources quoted by U.S. newspaper The Wall Street Journal.

Currently in Switzerland, the Competition Authority has opened an investigation for ten European banks, including UBS, Societe Generale, RBS and Credit Suisse, suspected to be handled the same reference rate as in the previous case, Libor and Tibor used to calculate interest loans in dollars, pounds, Swiss francs and Japanese yen.

We assume that all the three banks will form a cartel. In these conditions they will behave as if they have a monopoly on the online banking services market, causing a single price and trying to make the maximum profit, the goal being to eliminate competition.

Next we will determine the price that consumers will pay for online services offered by banks in such a union monopoly.

In terms of complexity and functionality offered, the three banking institutions will provide exactly the same services: $Q = q_1 + q_2 + q_3$, and the p charged price is unique.

Thus, the request function will become:

$$Q = 3 \left(3 * 10^6 * \theta - p + \sum_{j=4}^{10} p_j \right)$$

And the rational choice of players is to maximize profit:

$$\max_p \pi^c = (p - c) Q \quad (19)$$

$$\max_p \pi^c = (p - c) 3 \left(3 * 10^6 * \theta - p + \sum_{j=4}^{10} p_j \right) \quad (20)$$

$$\Rightarrow \frac{\partial \pi^c}{\partial p} = 0 \Rightarrow 3 * 10^6 * \theta - 2p + \sum_{j=1,2,3}^{10} p_j + c = 0$$

The optimum price in the cartel situation is:

$$p^{c*} = \frac{3 * 10^6 * \theta + c + \sum_{j=1,2,3}^{10} p_j}{2} \quad (21)$$

The obtained profit for the three banks under the cartel is:

$$Q = 3 * \frac{3 * 10^6 * \theta - c + \sum_{j=1,2,3}^{10} p_j}{2}$$

Any from the three banks will get the profit:

$$\pi^c = 3 * \frac{\left(3 * 10^6 * \theta - c + \sum_{j=1,2,3}^{10} p_j \right)^2}{4} \quad (22)$$

4.1 Results

For exemplification of this situation it was used the same dataset as those presented in the Bertrand dynamic oligopoly section.

Comparing the two situations, it can be observed that the profit for banks that have formed a cartel is much higher than the profit obtained by the players from the market.

Also, the fee that the bank should charge would be much greater than if they were not part of this scenario. For example we consider the first three banks by the number of internet banking customers.

The average number of customers of the three banks is about: 471667. This fee would be:

$$p^{c*} = \frac{3 * 10^6 * \theta + c + \sum_{j=1,2,3}^{10} p_j}{2}$$

The new balance fee charged by the banks from the cartel is 0.049791 Euros, which is 0.218 USD. It can be seen that the result of this agreement is clearly a much higher fee that the consumer must pay for it.

In conclusion, we can clearly see that the strategy dictates whether or not it takes a fee for the internet banking service. Some of the banks uses this service for increasing the profits while others uses it as a claw for getting more customers and selling other banking services.

5 Conclusions

With the Internet development and the rollup of financial crisis, worldwide banks had to switch to services that brings added value with a minimum of effort.

Thus, banks have oriented to the Internet, by developing the online banking services not only as an innovative payment method or to increase customer convenience, but also as a way to reduce costs and increase profits.

Fierce competition among banks worldwide has forced them to find profitable new areas to expand. Thus, internet banking services represented a viable strategy for both the old players on banking market, and for us players.

In this article it was analysed the online banking market in a developing country – Romania, and it was tried to surprise the banks strategies in relation to the brand power and market characteristics. With the help of the game theory it was determined the optimum cost that consumers should pay in the condition of a perfect market, but also in a banking cartel.

The main problem is the adoption degree of this kind of services, from the consumer’s side.

Even if the consumer’s reluctance is big enough, the banks with high market share take a profit from the benefits of the online services, by establishing high costs, while the small players don’t take a monthly fee for the online services, from the will to gain market share.

Regarding the situation towards the establishment of a cartel, the bank’s profits is increasing with the consumer’s fee rising.

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Authors description

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Data appendix

Table 1: Top banks on internet banking payment value in 2011 by physical persons

Bank Name	The value of transaction
ING Bank	2,2 billion euro (1,6 billion euro in 2010)
BCR	2 billion euro (1,15 billion euro in 2010)
UniCredit	1,2 billion euro (1, 3 billion euro in 2010)
BRD	1,15 billion euro (90 billion euro in 2010)
BT	750 million euro (600 million euro in 2010)
Raiffeisen	500 million euro (250 million euro in 2010)
Alpha Bank	150 million euro (130 million euro in 2010)
Bancpost	130 million euro (120 million euro in 2010)
CEC Bank	90 million euro (50 million euro in 2010)
Piraeus Bank	80 million euro (40 million euro in 2010)

Source: *www.bancherul.ro (2011)*

Table 2: Top 10 banks by 2010 assets

Bank Name	Internet banking (IB) price	2010 assets mil. LEI	%	IB clients
Banca Comerciala Romana	3 LEI/month	67647.3	19.8	700000
BRD Groupe Societe Generale	1 EUR/month	47494.1	13.9	NA
Raiffeisen Bank România	4 LEI/month	21782.9	6.5	515000
CEC Bank	3 LEI/month	21683.2	6.4	NA
Banca Transilvania	NA	21589.1	6.2	200000
Alpha Bank Romania	4 LEI/month	21324.9	6.2	NA
UniCredit Tiriatic Bank	1.25 EUR/month	20422.3	6	NA
Volksbank Romania	Free	19755.2	5.8	NA
Bancpost	NA	13461	3.9	123000
ING Bank N.V.	3 LEI/month	12047.6	3.6	NA

Source: *the bank's website*