THE EFFECTS OF FEES AND COMMISSIONS ON LOAN PRICING AND PROFITABILITY: THEORETICAL EVIDENCES

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Abstract

Intensifying competition in the banking sector in the 1990's increased the importance of the non-interest income activities for banks. Banks sought the ways of selling non-interest products and targeted their core costumers as a reaction against increasing competition. To fulfill their objectives, they introduced pricing strategies that connect interest and non-interest products. In this vein, price information level differences play a key role to turn good old days. This study theoretically extends the Kim et al. (2003)'s model by integrating the fees and commissions charged from the loan activities into the model in the presence of less- and well-informed customers. Theoretical extension shows that there is a negative relationship between loan price and, fees and commissions. Moreover, the study provides that this negative relationship helps banks to increase their profit by renting from less-informed loan customers.

Keywords: Bank income diversification, Fees and commissions, Switching cost

BANKACILIK KOMİSYON VE ÜCRETLERİNİN KREDİ FİYATLARINA VE KARLILIĞA ETKİSİ:

TEORİK KANITLAR

Özet

Bankacılık sektöründe 1990'larda artan rekabet bankalar için faiz-dışı gelirin önemini artırdı. Bankalar faiz-dışı ürün satmanın yollarını aramaya başladılar ve kredi müşterilerini hedef seçtiler. Bankalar bu amaçlarını gerçekleştirmek için yeni fiyat stratejileri ortaya koydular ve faiz ile faiz-dışı gelir arasında bağlantı kurdular. Bu bağlamda, müşterilerin kredi faizi fiyat bilgileri farklılıkları eski günlere dönüşte anahtar bir rol oynamakta. Bu çalışma, Kim vd. (2003)'ün modelini, müşterilerin farklı fiyat bilgisi seviyesini göz önünde bulundurarak, kredilerden alınan bankacılık ücret ve komisyonlarını entegre ederek genişletmektedir. Teorik çalışma kredi fiyatı ile bankacılık ücret ve komisyonları arasındaki negatif ilişkiyi ortaya koymaktadır. Dahası bu negatif ilişkinin bankanın fiyat bilgisi az olan müşteriler sayesinde daha fazla kâr elde etmesinde rol oynadığını ortaya koymaktadır.

Anahtar Kelimeler: Banka gelir çeşitlendirmesi, ücret ve komisyonlar, banka değiştirme maliyeti

INTRODUCTION

The financial deregulations and increasing competition in the banking sector reduced the loan profitability of the banks in the 1990's. Banks shifted from traditional income activities to alternative non-traditional income activities to increase their profitability. Adding to deregulation and competition factors, product innovation and increasing technology are other factors that motivated banks to sell non-interest products.

To sell non-interest products, banks, firstly, need customer for their non-interest products. One type of potential customers to their non-interest products, by its very nature, is their traditional loan customers. Banks, then, seek the ways of selling non-interest products to the core customers. Selling interest and non-interest products together is one of the reasonable ways of it. The problem in cross-selling to the core customers is persuading these core customers. In this respect, banks have implemented two strategies. One of the two strategies is presenting their non-interest product as a complement of loan product. Complement products are selected with respect to the customers' loan type and their preferences. Particularly insurance product sales to loan customer is the main way of selling complement product, such as mortgage and travel insurances. Buying complement product with loan reduces the uncertainties against finding complement product from other banks or institutions for the customers. Another way of selling non-interest product to core customers is charging fees and commissions from the loan activity as non-separable component of loan activity. Generally loan and, fees and commissions are offered as a package. The strategy of the bank in here is the lowering loan price and then charging higher fees and commissions. This strategy of the banks yields rip-offs on unadvertised or small print price or bank customer may learn other costs once he is in the contract signing process. Therefore, there is a negative relationship is generated between fees and commission income and interest income (Carbo and Fernandez, 2007; Lepetit et al., 2008; Maudos and Solis, 2009).

The negative association created between fees and commission, and interest income is generally grounded by the information level differentials of the customers. Banks benefit from the impatience and low information level of the customers. In this respect, customers can be classified as two groups: well- and less-informed customers. Well-informed customers are the customers who consider the fees and commissions charged from loan transaction and therefore calculate the total cost of the loan transaction. Less-informed customers, however, compare only the loan price of the banks. Having information about availability of these less-informed customers leads banks to lower their interest rates to attract these customers, whom they can later exploit by charging fees and commissions. The main objective of the banks is the gross

income rather than the interest income. This objective of the banks changes the structure of the income statement, radically.

Adding to the changing structure of the income statements of the banks, fees and commission income also affect bank switching costs of the customer and bank market share. Loan price and switching costs are not whole factors affecting switching probability of a customer. Because loan prices are also impacted from fees and commissions, fees and commissions should be considered as an important factor in bank switching. Fees and commission price is important even in selection of main bank rather than the second bank (Devlin and Gerrard, 2005).

This study extends the Kim et al. (2003)'s model by integrating the effect of cross-selling policy of the banks on bank market share and price-cost margin by considering the information level differentials of the customers. The motivation of the bank in here is exploiting these information level differentials of the customers. The presence of the information level differences of the customers leads banks to focus on gross income rather than the interest income and determine their prices with respect to the gross income. Thus, theoretical study provides evidence that banks increase their gross margin by reducing price-cost margin of loan and charging fees and commission from the loan activity to increase gross margin.

The rest of the paper proceeds as follows: Section 2 reviews the relevant literature on fees and commission income and switching cost. Section 3 offers theoretical evidences for the fees and commission income and interest income relationship in the presence of well- and less-informed customers. Section 4 concludes.

1. LITERATURE REVIEW

This theoretical study extends Kim et al. (2003)'s model by integrating the insight of information level differentials of customers and cross selling policies of banks in the presence of switching costs of the banks. One part of the literature examines the factors affecting switching costs. Klemperer (1987) explains bank market share by employing switch cost as an instrument for corporate strategy. Ausubel (1991) reports that credit card interest rates have been exceptionally sticky relative to the cost of funds in the 1980's. Furthermore, major credit card issuers have persistently earned from three to five times the ordinary rate of return over the period 1983 and 1988. These higher earnings imply that many consumers are insensitive to interest rate differentials because of the disbelief on other banks' rates. Barone et al. (2011) find that firms changing their main lender expose them to significant switching costs.

Some other studies in the literature analyze changing interest rates in case of bank switching. By using the Bolivian credit registry between 1999 and 2003, Ioannidou and Ongena (2010) find that a loan offered by a new bank carries a loan rate that is significantly lower than the rates offered by firm's current banks. The policy of the new bank is attracting the firm by lower rate in the first period and then increases the loan rate sharply to compensate the first period losses. According to the study, the switching firm turns to the interest rate offered by previous banks in three years. Black (2006) highlights the information asymmetry between lenders. The outside bank, potential new bank of customer, wins more bad firms and less good firms than the inside bank, current bank of customer, due to the winner's curse. The main reason behind this result would be that outside banks win more bad firms, since bad firms borrow at a higher rate. As a result outside rate is higher than inside rate. They also find that outside loan rates are 40 bases higher than current bank but Barone et al. (2006) find that switched customers pay lower.

Another strand of the literature calculates the amount of switching cost. Findings of Shy (2002) show that data switching between banks varies 0 to 11% of the average balance in the Finland market for bank accounts. Similarly, Kim et al. (2003) find that switching costs are about one- third of the average interest rate. This study also makes theoretical contribution by developing structural model. They propose a model such that transition and staying probabilities available for customers. Probabilities depend on the loan prices and switching costs. The model derives to the factors affecting market share and price-cost margin. This model is theoretically extended by Zhao et al. (2013) by introducing switching costs for non-interest products. Their empirical findings show that switching cost increases as a result of weakening competition in the loan market.

2. THEORY

2.1. Model

Theory assumes n firms oligopoly so that banks compete in a multiple stage. Each customer purchases a single unit loan for each period. There are infinitely many discrete periods. Customers and banks maximize their utilities with respect to prices of the banks. However, despite switching is possible from one bank to another, switching process is costly. Therefore, probability of arrival of a customer to a bank depends on prices and switching costs.

Transition probabilities from one bank to another are the demand side of the maximization problem. Customer chooses the bank with respect to prices and

switching cost which creates a transition or staying probability. Transition probabilities are Markovian. Incorporation of switching cost to the model is done by the addition of switching cost to the price. If a customer stays at the same bank for the next period, it is denoted by $Pr_{i \to i,t}$. Bank i may attract customers from bank j and its probability is $Pr_{j \to i,t}$. These probabilities are the functions of prices charged by bank $p_{l,i,t}$ and switching cost. Rival banks' prices also affect the probabilities and it is (n-1) vector $p_{l,i,t}$. The probability of continuing at the same bank

$$Pr_{i \to i,t} = f(p_{l,i,t}, p_{l,iR,t} + s) \tag{1}$$

where s is a n-1 vector of switching cost. It equals the scalar s times (n-1) unity vector. The probability of switching from a rival bank j to bank i

$$Pr_{j \to i,t} = f(p_{l,i,t} + s, p_{l,iR,t} + s_j) \tag{2}$$

In aggregate data, transitions are not observed. Model formulate the switching to bank i unconditional on bank j is

$$Pr_{iR \to i,t} = \sum f(p_{l,i,t} + s, p_{l,iR,t} + s_j) \frac{y_{j,t-1}}{\sum_{y \neq k} y_{k,t-1}} \tag{3}$$

where $Pr_{iR \to i,t}$ is switching of rival's customer to bank i. $y_{j,t-1}$ is the output of bank j at time t-1. We denote probability that customer of randomly selected bank that rival to bank i is one who purchased from bank j.

The probability of switching of a customer from one bank to another increase with lower price of switched bank. Bank i attracts the customers of other banks by lowering its price. Therefore, increase in loan price of bank i reduces the likelihood of keeping their customers and increase in loan price of rival bank increases the transition to the bank i. Likewise, increase in loan price of bank i, increases the probability of switching to rival bank and increase in the rival's loan price increases transition to the bank i from its rivals.

Total demand for bank i is equal to the bank i's previous period output and new comers from rivals. Output of bank i at time t is:

$$y_{i,t,1} = y_{i,t-1,1} Pr_{i \to i,t} + y_{iR,t-1,1} Pr_{iR \to i,t} \tag{4}$$

The first term is the multiplication of the previous period output with probability of keeping old customers in bank i and the second term is the output stemmed from new customers and multiplication with their arrival probability. It is also available to change purchased quantity over time by allowing market growth:

$$y_{i,t,1} = [y_{i,t-1,1} Pr_{i \to i,t} + y_{iR,t-1,1} Pr_{iR \to i,t}] g_t \tag{5}$$

where g_t is the market growth rate and exogenous. $g_t \equiv \frac{\sum y_{i,t}}{\sum y_{i,t-1}}$. Since actual customer decisions are not observable, aggregate data provide net changes only and therefore we derive a demand which depends on market share of bank i. First order linear approximation is applied on the transition probabilities. The probabilities are as follows:

$$Pr_{i \to i,t} = a_0^i + a_1 p_{l,i,t} + a_2 \bar{p}_{l,iR,t} + s \tag{6}$$

and

$$Pr_{iR \to i,t} = a_0^i + a_1 (p_{l,i,t} + s) + a_2 \bar{p}_{l,iR,t} + \frac{n-2}{n-1} s \tag{7}$$

where a_0^i denotes bank specific effect. Own price elasticity of bank is denoted by a_1. It is negative for derivative of $Pr_{i \to i,t}$ with respect to $p_{l,i,t}$ because increasing loan price of bank reduces the probability of keeping customer at the same bank. The term a_2 implies the cross price elasticity. Different than a_1, its sign is positive: increase in price of rival firm increases the transition probability. Last function is not a function of a specific rival j, but it is the transition probability of a rival's customer which is selected randomly.

Under the inelastic total demand, an increase in $p_{l,i,t}$ should have the same effect on the transition probabilities as that of decrease of same size in rival's average price. Thus, it is restricted that $a_1 = -a_2$. Then, transition probabilities become

$$Pr_{i \to i,t} = a_0^i + a_1 (p_{l,i,t} - \bar{p}_{l,iR,t} - s) \tag{8}$$

and

$$Pr_{iR \to i,t} = a_0^i + a_1 \left(p_{l,i,t} - \bar{p}_{l,iR,t} - \frac{s}{n-1} \right) \tag{9}$$

Now, it is possible to reach market share equation of bank i at time t. Output of bank i at time t is as follows:

$$y_{i,t,1} = \left[y_{i,t-1,1} \left(a_0^i + a_1 (p_{l,i,t} - \bar{p}_{l,iR,t} - s) \right) + y_{iR,t-1,1} \left(a_0^i + a_1 \left(p_{l,i,t} - \bar{p}_{l,iR,t} + \frac{s}{n-1} \right) \right) \right] g_t \tag{10}$$

Then, market share equation is

$$\sigma_{i,t,1} = \left[-\sigma_{i,t-1,1} \frac{n}{n-1} s a_1 + \left(a_0^i + a_1 \left(p_{l,i,t} - \bar{p}_{l,iR,t} + \frac{s}{n-1} \right) \right) \right] \tag{11}$$

Equation (11) states that current market share of the bank i is dependent on loan price. a_1 is negative and this implies that increase in loan price negatively affects bank market share. Current market share of the bank i also depends on previous period market share. Established market share is crucial for banks since it represents locked-in loan customers. Until now, information level differentials of the customers and, fees and commission policies of the banks are ignored. In the next section, first, present value maximization will be made without introducing fees and commissions. In the second

scenario, fees and commission policy is integrated to the model in the presence of well-informed customers only. In the third scenario, customers will be divided into two groups: well- and less-informed loan customers. By considering information level differentials, banks' fees and commission strategy will be introduced to the model and then the difference between price-cost margins will show the effect of the fees and commissions in the presence of information-level differences.

2.2. Present Value Maximization

2.2.1. Pricing strategy with only well-informed customers

For maximization of present value, bank i sets a price so that its profit at time τ will be affected from this price. This means that bank decides inter-temporal price for value maximization.

$$\frac{\Omega V_{i,\tau}}{\Omega p_{l,i,\tau}} = \sum_{t=\tau} \delta^{t-\tau} \frac{\Omega \pi_{i,t,1}}{\Omega p_{l,i,\tau}} = 0 \tag{12}$$

where $V_{i,\tau}$ is value of profit at time τ and $\pi_{i,t,1} = y_{i,t,1} p_{l,i,t} - c_{i,t}$. $c_{i,t}$ is the vector of input prices. Input prices include loan costs only.

$$\frac{\Omega V_{i,\tau}}{\Omega p_{l,i,\tau}} = y_{i,\tau,1} + \sum_{t=\tau}^{\infty} \delta^{t-\tau} \left(p_{l,i,t} - \frac{\Omega c_{i,t}}{\Omega y_{i,\tau,1}} \right) \frac{\Omega y_{i,t,1}}{\Omega p_{l,i,\tau}} = 0 \tag{13}$$

Another requirement for maximization is that present value must be optimal with respect to $\tau + 1$:

$$\frac{\Omega V_{i,\tau}}{\Omega p_{l,i,\tau+1}} = y_{i,\tau+1,1} + \sum_{t=\tau}^{\infty} \delta^{t-\tau} \left(p_{l,i,t} - \frac{\Omega c_{i,t}}{\Omega y_{i,\tau,1}} \right) \frac{\Omega y_{i,t,1}}{\Omega p_{l,i,\tau+1}} = 0 \tag{14}$$

Following the Kim et al. (2003)'s approach, since both of them are optimal, then their linear combination will be optimal, as well. Henceforth, any $dp_{l,i,\tau}$ and any $dp_{l,i,\tau+1}$ will become

$$\frac{\Omega V_{i,\tau}}{\Omega p_{l,i,\tau}} dp_{l,i,\tau} + \frac{\Omega V_{i,\tau}}{\Omega p_{l,i,\tau+1}} dp_{l,i,\tau+1} = 0 \tag{15}$$

$$dp_{l,i,\tau+1} = - \frac{\Omega y_{i,t+1,1}}{\Omega p_{l,i,\tau}} / \frac{\Omega y_{i,t+1,1}}{\Omega p_{l,i,\tau+1}} \, dp_{l,i,\tau} \tag{16}$$

For the demand side, output at time t is

$$y_{i,t,1} = \left[y_{i,t-1,1} \left(a_0^i + a_1 (p_{l,i,t} - \bar{p}_{l,iR,t} - s) \right) + y_{iR,t-1,1} \left(a_0^i + a_1 \left(p_{l,i,t} - \bar{p}_{l,iR,t} + \frac{s}{n-1} \right) \right) \right] g_t \tag{17}$$

or

$$y_{i,t,1} = \left[-y_{i,t-1,1} \frac{n}{n-1} s a_1 + y_{t-1,1} \left(a_0^i + a_1 \left(p_{l,i,t} - \bar{p}_{l,iR,t} + \frac{s}{n-1} \right) \right) \right] g_t \tag{18}$$

Taking derivative of total demand at time t wrt to loan price at time t is

$$\frac{\Omega y_{i,t,1}}{\Omega p_{l,i,t}} = y_{t-1,1} a_1 g_t \tag{19}$$

Then,

$$dp_{l,i,\tau+1} = \frac{n}{n-1} sa_1 dp_{l,i,\tau} \tag{20}$$

Since $y_{i,t+1,1}$ is unchanged in choose a pair of price differentials

$$\left(\frac{\Omega \pi_{i,\tau}}{\Omega p_{l,i,\tau+1}} + \delta \frac{\Omega \pi_{i,\tau}}{\Omega p_{l,i,\tau+1}}\right) dp_{l,i,\tau} + \delta \frac{\Omega \pi_{i,\tau+1}}{\Omega p_{l,i,\tau+1}} dp_{l,i,\tau+1} = 0 \tag{21}$$

Since $y_{i,t+1,1}$ is constant

$$\frac{\Omega \pi_{i,\tau}}{\Omega p_{l,i,\tau}} dp_{l,i,\tau} + \delta y_{i,t+1,1} dp_{l,i,\tau} = 0 \tag{22}$$

If price differentials are removed

$$\frac{\Omega \pi_{i,\tau,1}}{\Omega p_{l,i,\tau}} + \delta y_{i,t+1,1} \frac{n}{n-1} sa_1 = 0 \tag{22}$$

$$\pi_{i,t,1} = y_{i,t,1} p_{l,i,t} - C(L_{i,t,1}) \tag{23}$$

where $C(L_{i,t,1})$ is the operational cost of the loan activity. Derivative of profit wrt to loan price is

$$\frac{\Omega \pi_{i,t,1}}{\Omega p_{l,i,t}} = \frac{\Omega y_{i,t,1} p_{l,i,t}}{\Omega p_{l,i,t}} - \frac{\Omega C(L_{i,t,1})}{\Omega y_{i,t,1}} \frac{\Omega y_{i,t,1}}{\Omega p_{l,i,t}}$$

$$= y_{i,t,1} + (p_{l,i,t} - MCL_{i,t,1}) y_{i,t-1,1} a_1 g_t \tag{24}$$

Then, loan price-cost margin will be

$$lpcm_{i,t,1} = - \delta \sigma_{i,t+1,1} \frac{n}{n-1} sg_{t+1} - \frac{\sigma_{i,t,1}}{a_1} \tag{25}$$

where $lpcm_{i,t,1}$ is the loan price-cost margin when all customers are assumed well-informed but fees and commissions are not integrated to the model.

2.2.2. Fees and commissions strategy with well-informed customers

Proposition 1: Charging fees and commissions from loan activities creates a negative relationship between loan price-cost margin and, fees and commissions.

Similar to the first scenario, bank maximizes its value with respect to loan price again

$$\frac{\Omega V_{i,\tau}}{\Omega p_{l,i,\tau}} = \sum_{t=\tau} \delta^{t-\tau} \frac{\Omega \pi_{i,t,2}}{\Omega p_{l,i,\tau}} = 0 \tag{26}$$

However, banks no longer use only its loan price but employ fees and commissions, as well. Suppose that demand for the loan product of the bank *i* at time t depends on loan price $p_{l,i,t}$ and fee price, $p_{f,i,\tau}$. Introducing fees and commissions change the demand side equations. Then, output at time t is

$$y_{i,t,2} = [y_{i,t-1,2}\left(a_0^i + a_1(p_{l,i,t} + p_{f,i,t} - \bar{p}_{l,iR,t} - \bar{p}_{f,iR,t} - s)\right)$$

$$+ y_{iR,t-1,2}\left(a_0^i + a_1\left(p_{l,i,t} + p_{f,i,t} - \bar{p}_{l,iR,t} - \bar{p}_{f,iR,t} + \frac{s}{n-1}\right)\right)]g_t \tag{27}$$

or

$$y_{i,t,2} = [-y_{i,t-1,2}\frac{n}{n-1}sa_1 + y_{t-1,2}\left(a_0^i + a_1\left(p_{l,i,t} + p_{f,i,t} - \bar{p}_{l,iR,t} - \bar{p}_{f,iR,t} + \frac{s}{n-1}\right)\right)]g_t \tag{28}$$

If total demand is maximized with respect to loan price, $p_{l,i,t}$, then

$$\frac{\Omega y_{i,t,2}}{\Omega p_{l,i,t}} = y_{t-1,2}a_1g_t \tag{29}$$

Time t+1 demand will be

$$y_{i,t+1,2} = [-y_{i,t,2}\frac{n}{n-1}sa_1 + y_{t,2}\left(a_0^i + a_1\left(p_{l,i,t+1} + p_{f,i,t+1} - \bar{p}_{l,iR,t+1} - \bar{p}_{f,iR,t+1} + \frac{s}{n-1}\right)\right)]g_{t+1} \tag{30}$$

Differentiating time t+1 output with respect to time t price gives

$$\frac{\Omega y_{i,t+1,2}}{\Omega p_{l,i,t}} = -y_{t-1,2}a_1g_t\frac{n}{n-1}sa_1g_{t+1} \tag{31}$$

and

$$\frac{\Omega y_{i,t+1,2}}{\Omega p_{l,i,t+1}} = y_{t-1,2}a_1g_tg_{t+1} \tag{32}$$

Profit of the firm at time t can be written as:

$$\pi_{i,t,2} = y_{i,t,2}(p_{l,i,t} + p_{f,i,t}) - C(L_{i,t,2}) - C(F_{i,t,2}) \tag{33}$$

where $C(F_{i,t,2})$ is the operational cost of the fees and commissions. Different than the first scenario, profit equation changes because bank charges fees and commission from the loan activities. Derivative of profit wrt to loan price is

$$\frac{\Omega \pi_{i,t,2}}{\Omega p_{l,i,t}} = \frac{\Omega y_{i,t,2}p_{l,i,t}}{\Omega p_{l,i,t}} + \frac{\Omega y_{i,t,2}p_{fi,t}}{\Omega p_{l,i,t}} - \frac{\Omega C(L_{i,t,2})}{\Omega y_{i,t,2}}\frac{\Omega y_{i,t,2}}{\Omega p_{l,i,t}} - \frac{\Omega C(F_{i,t,2})}{\Omega y_{i,t,2}}\frac{\Omega y_{i,t,2}}{\Omega p_{l,i,t}}$$

$$= y_{i,t,2} + (p_{l,i,t} - MCL_{i,t,2})y_{t-1,2}a_1g_t + (p_{f,i,t} - MCF_{i,t,2})y_{t-1,2}a_1g_t \tag{34}$$

Then, loan price-cost margin will be

$$lpcm_{i,t,2} = -\frac{\sigma_{i,t,2}}{a_1} - \delta\sigma_{i,t+1,2}\frac{n}{n-1}sg_{t+1} - (p_{f,i,t} - MCF_{i,t,2}) \tag{35}$$

where $lpcm_{i,t,2}$ is the price-cost margin of loan in the presence of fees and commissions. As it is seen from loan price-cost margin, fees and commissions negatively affects the fees and commissions. Because bank value optimization also requires the optimization of fees and commissions, same procedure is applied to find optimum price cost margin for fees and commissions. The output of the bank will not change since both loan and, fees and commission prices are used for the output y. Then, the optimal price-cost margin for fees and commissions is

$$fpcm_{i,t,2} = -\frac{\sigma_{i,t,2}}{a_1} - \sigma_{i,t+1,2}\delta\frac{n}{n-1}sg_{t+1} - (p_{l,i,t} - MCL_{i,t,2}) \tag{36}$$

where $fpcm_{i,t,2}$ is the price-cost margin of fees and commissions. After finding the optimal loan and, fees and commissions prices, it is easy to derive gross price-cost margin of the bank. The share of the fees and commissions, and loan in total income is proportional to their prices. Therefore, the sum of the fees and commissions, and loan price-cost margins gives the gross price-cost margin. Hence, the gross price-cost margin (gpcm) of bank i is the sum of $lpcm_{i,t,2}$ and $fpcm_{i,t,2}$:

$$gpcm_{i,t,2} = -\frac{1}{4}\frac{\sigma_{i,t,2}}{a_1} - \frac{1}{4}\delta\sigma_{i,t+1,2}\frac{n}{n-1}sg_{t+1} \tag{37}$$

2.2.3. Fees and commissions strategy with less- and well-informed customers

Proposition 2: *Charging fees and commissions from loan activities increases the gross income of the bank in the presence of less-informed customers, if* $-\frac{1}{a_1}\left(\frac{3}{4}\sigma_{i,t,3} - \sigma_{i,t,1}\right) > \frac{n}{n-1}sg_{t+1}\left(\frac{3}{4}\sigma_{i,t+1,3} - \sigma_{i,t+1,1}\right)$

Similar to the first and second scenario, bank maximizes its value with respect to loan price again

$$\frac{\Omega V_{i,\tau}}{\Omega p_{l,i,\tau}} = \sum_{t=\tau}\delta^{t-\tau}\frac{\Omega\pi_{i,t,3}}{\Omega p_{l,i,\tau}} = 0 \tag{38}$$

Now, different than the Kim et al. (2003)'s model, it is also assumed that there are two types of customers: well-informed customers who consider the fees charged in loan application process and less-informed customers who consider only loan price and thus compare only loan prices for banks. Introducing fees and commissions change the demand side equations. Then, output at time t is

$$y_{i,t,3} = [y_{i,t-1,3}\left(a_0^i + a_1(p_{l,i,t} - \bar{p}_{l,iR,t} - s)\right) + y_{iR,t-1,3}\left(a_0^i + a_1\left(p_{l,i,t} - \bar{p}_{l,iR,t} + \frac{s}{n-1}\right)\right)$$

$$+ y_{i,t-1,3}\left(a_0^i + a_1(p_{l,i,t} + p_{f,i,t} - \bar{p}_{l,iR,t} - \bar{p}_{f,iR,t} - s)\right)$$

$$+ y_{iR,t-1,3}\left(a_0^i + a_1\left(p_{l,i,t} + p_{f,i,t} - \bar{p}_{l,iR,t} - \bar{p}_{f,iR,t} + \frac{s}{n-1}\right)\right)]g_t \tag{39}$$

or

$$y_{i,t,3} = [-y_{i,t-1,3}\frac{n}{n-1}sa_1 + y_{t-1,3}\left(a_0^i + a_1\left(p_{l,i,t} - \bar{p}_{l,iR,t} + \frac{s}{n-1}\right)\right)$$

$$- y_{i,t-1,3}\frac{n}{n-1}sa_1 + y_{t-1,3}\left(a_0^i + a_1\left(p_{l,i,t} + p_{f,i,t} - \bar{p}_{l,iR,t} - \bar{p}_{f,iR,t} + \frac{s}{n-1}\right)\right)]g_t \tag{40}$$

Now, transition and staying probabilities of less-informed customers are different than the well-informed customers such that less-informed customers ignore the fees and commission price. If total demand is maximized with respect to prices $p_{l,i,t}$ and $p_{f,i,t}$ then

$$\frac{\Omega y_{i,t,3}}{\Omega p_{l,i,t}} = y_{t-1,3}a_1g_t \tag{41}$$

Time t+1 demand will be

$$y_{i,t+1,3} = [-y_{i,t,3}\frac{n}{n-1}sa_1 + y_{t,3}\left(a_0^i + a_1\left(p_{l,i,t+1} - \bar{p}_{l,iR,t+1} + \frac{s}{n-1}\right)\right)$$

$$-y_{i,t,3}\frac{n}{n-1}sa_1 + y_{t,3}\left(a_0^i + a_1\left(p_{l,i,t+1} + p_{f,i,t+1} - \bar{p}_{l,iR,t+1} - \bar{p}_{f,iR,t+1} + \frac{s}{n-1}\right)\right)]g_{t+1} \qquad (42)$$

Differentiating time t+1 output with respect to time t price gives

$$\frac{\Omega y_{i,t+1,3}}{\Omega p_{l,i,t}} = -2y_{t-1,3}a_1 g_t \frac{n}{n-1}sa_1 g_{t+1} \qquad (43)$$

and

$$\frac{\Omega y_{i,t+1,3}}{\Omega p_{l,i,t}} = 2y_{t-1,3}a_1 g_t g_{t+1} \qquad (44)$$

Bank *i*'s profit at time t is

$$\pi_{i,t,3} = y_{i,t,3}(p_{l,i,t} + p_{f,i,t}) - C(L_{i,t,3}) - C(F_{i,t,3}) \qquad (45)$$

The magnitude of the profit will change since probabilities of arrival will increase by lowering loan price. Derivative of profit wrt to loan price is

$$\frac{\Omega \pi_{i,t,3}}{\Omega p_{l,i,t}} = \frac{\Omega y_{i,t,3}p_{l,i,t}}{\Omega p_{l,i,t}} + \frac{\Omega y_{i,t,3}p_{f,i,t}}{\Omega p_{l,i,t}} - \frac{\Omega C(L_{i,t,3})}{\Omega y_{i,t,3}}\frac{\Omega y_{i,t,3}}{\Omega p_{l,i,t}} - \frac{\Omega C(F_{i,t,3})}{\Omega y_{i,t,3}}\frac{\Omega y_{i,t,3}}{\Omega p_{l,i,t}}$$

$$= y_{i,t,3} + (p_{l,i,t} - MCL_{i,t,3})2y_{t-1,3}a_1 g_t + (p_{f,i,t} - MCF_{i,t,3})2y_{t-1,3}a_1 g_t \qquad (46)$$

Since $\frac{\Omega \pi_{i,t,3}}{\Omega p_{l,i,t}} + y_{i,t+1,3}\delta\frac{n}{n-1}sa_1 = 0$, then

$$lpcm_{i,t,3} = -\sigma_{i,t+1,3}\delta\frac{n}{n-1}sg_{t+1} - \frac{\sigma_{i,t,3}}{a_1} - (p_{f,i,t} - MCF_{i,t,3}) \qquad (47)$$

where $lpcm_{i,t,3}$ is the loan price-cost margin in the presence of information level differences. Because bank value optimization also requires the optimization of fees and commissions, same procedure is applied to find optimum $fpcm_{i,t,3}$. The output of the bank will not change since both loan and, fees and commission prices are used for the output y. Then, the optimal price-cost margin for fees and commissions is

$$fpcm_{i,t,3} = -\frac{\sigma_{i,t,3}}{a_1} - (p_{l,i,t} - MCL_{i,t,3}) - \sigma_{i,t+1,3}\delta\frac{n}{n-1}sg_{t+1} \qquad (48)$$

where $fpcm_{i,t,3}$ is the price-cost margin of fees and commissions. The gross price-cost margin ($gpcm_{i,t,3}$) of bank *i* is the sum of $lpcm_{i,t,3}$ and $fpcm_{i,t,3}$:

$$gpcm_{i,t,3} = -\frac{3}{4}\frac{\sigma_{i,t,3}}{a_1} - \frac{3}{4}\sigma_{i,t+1,3}\delta\frac{n}{n-1}sg_{t+1} \qquad (49)$$

If the gross price-cost margin in Equation (49) is higher than loan price-cost margin in Equation (25)[1], then bank benefits from price information level differentials of the customers by introducing fees and commissions. Then,

$$gpcm_{i,t,3} - lpcm_{i,t,1} = -\frac{1}{a_1}\left(\frac{3}{4}\sigma_{i,t,3} - \sigma_{i,t,1}\right) - \delta\frac{n}{n-1}sg_{t+1}\left(\frac{3}{4}\sigma_{i,t+1,3} - \sigma_{i,t+1,1}\right) \quad (50)$$

If $-\frac{1}{a_1}\left(\frac{3}{4}\sigma_{i,t,3} - \sigma_{i,t,1}\right) > \frac{n}{n-1}sg_{t+1}\left(\frac{3}{4}\sigma_{i,t+1,3} - \sigma_{i,t+1,1}\right)$, then bank increases its gross margin by exploiting information level differences of the loan customers in the presence of fees and commissions.

Proposition 3: *Presence of less-informed customer in charging fees and commission increases the bank gross income,* if $-\frac{1}{4a_1}\left(3\sigma_{i,t,3} - \sigma_{i,t,2}\right) > \frac{1}{4}\delta\frac{n}{n-1}sg_{t+1}\left(3\sigma_{i,t+1,3} - \sigma_{i,t+1,2}\right)$

Now, the difference between gross price-cost margin found in Equation (49) and loan price-cost margin found in equation (37) gives the effect of fees and commission income in the presence of both the less and well-informed customers. If the gross margin in the third scenario is higher than in second scenario, then, bank increases its profitability by benefiting from information level differentials. If $gpcm_{i,t,2}$ is subtracted from $gpcm_{i,t,3}$,

$$gpcm_{i,t,3} - gpcm_{i,t,2} = -\frac{1}{4a_1}\left(3\sigma_{i,t,3} - \sigma_{i,t,2}\right) - \frac{1}{4}\delta\frac{n}{n-1}sg_{t+1}\left(3\sigma_{i,t+1,3} - \sigma_{i,t+1,2}\right) \quad (51)$$

If $-\frac{1}{4a_1}\left(3\sigma_{i,t,3} - \sigma_{i,t,2}\right) - \frac{1}{4}\delta\frac{n}{n-1}sg_{t+1}\left(3\sigma_{i,t+1,3} - \sigma_{i,t+1,2}\right)$, bank increases gross margin by exploiting rent from less-informed customers.

As it is seen from the Equations (50) and (51), the main factor that determines the higher gross margin is the market share of the bank. If the market share of the bank is higher in the third scenario than the first and second, then bank can increases its gross margin. From this point of view, bank *i* increases its market share by benefiting from less-informed customers. Because less-informed customers ignore the fees and commissions charged from the loan activities, their likelihood of arrival to the bank does not affected from the fees and commissions. Therefore, bank *i* increases its market share by lowering its loan price. Increasing market share also increases the price-cost margin and therefore bank *i* reach to the higher gross income.

CONCLUSIONS

This paper extends the Kim et al. (2003)'s model by integrating the fees and commission income into the model in the presence of both well- and less-informed customers. Banks seek the ways of selling non-interest products to their core customers due to the reducing interest margins in the banking

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[1] Because fees and commissions ignored in the first scenario, the gross price-cost margin in the first scenario is equal to the loan price-cost margin.

sector. In this respect, combining loan and fee products is a profitable way of implementing this policy. Because less-informed customers do not regard the fees and commissions charged from loan activities, the loan price becomes one of the main factors in bank selection for loan, as well as switching cost. Reducing the loan price attracts the less-informed customers. To compensate the losses from the reduced loan prices, banks charge fees and commission. Thus, rather than determining higher loan price without fees and commissions, banks choose to lower its core product price. By reducing loan price, banks increase the likelihood of arrival of the customer and increase their market share. Increase in market share contributes banks to increase their gross margin.

The extended version of the model shows that fees and commission income negatively affects loan price-cost margin. Moreover, the model highlights the importance of gross margin rather than the loan price-cost margin by showing that banks make more profit by focusing on gross margin. The logic behind focusing on gross margin is the information level differentials of the customers. Increasing complaints about renting from less-informed customers are growing. Banks, politicians and decision-makers should evaluate the consequences of these loan pricing strategies and this study provides a theoretical background to clarify this issue.

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