The Effects of Banking Competition, Inflation and Transaction Costs on Electronic Transaction Service

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ABSTRACT

The study aims to provide theoretical framework for the impact of banking competition, inflation and transaction costs on electronic transaction service. Electronic transaction service in this study is referred to the case that depositors can access their accounts from long distance. The examples of electronic transaction service are ATM and debit card. The results show that a higher degree of competition results in a higher aggregate amount of electronic transaction service. Interestingly, the effect of banking competition is stronger when the transaction costs decrease.   In addition, when the cost of processing electronic transaction service is lower, banks offer a higher amount of electronic transaction service. Furthermore, an increase in inflation rate results in a higher amount of electronic transaction service. In this manner, banks should compete more in the market for electronic transaction service and develop new technology system consistently to lower transaction costs. Consequently, depositors will gain more access and use more electronic transaction service.

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INTRODUCTION

There have been considerable changes in the market for electronic transaction services. For example, Hannan (2005) shows that removing the surcharge ban has resulted in a higher degree of banking concentration. In addition, Stavins (2000) argues that large banks impose higher surcharges than small institutions after controlling for the number of ATM machines and operating costs. Equally important to the development in the withdrawal fees is the evolution in costs of providing withdrawal services. Notably, switch fees have demonstrated a downward trend in recent years.

From empirical studies, both the competitive structure and transaction costs have a significant impact on the availability of electronic transaction service. However, it is also important to examine whether productivity gains have been limited by pricing distortions in the market for electronic transaction service. Furthermore, as illustrated by numerous research, inflation plays a significant role in financial market activity. Yet, very little theoretical research has studied the impact of inflation on the use of electronic transaction service. Consequently, there is little formal analysis that provides the effect of inflation in an economy with different degree of imperfectly competition.

In an attempt to address these issues, I develop a model in which banks play an important role in the economy. As in Diamond and Dybvig (1983), financial institutions promote risk sharing services in the economy. Furthermore, the role of money is well defined. In particular, following Townsend (1987) and Schreft and Smith (1997), spatial separation and private information generate a transactions role for money.

LITERATURE REVIEWS

Both Berger and Hannan (1991) and Neumark and Sharpe (1992) find that monopolistic banks exercise their influence by distorting prices. To be specific, Berger and Hannan observe that banks in markets with higher concentration pay lower rates on deposits. In contrast, Neumark and Sharpe (1992) examine the effect of competition on price rigidities. In addition to banking structure, a number of studies indicate that inflation has a significant impact on financial activity. Notably, Boyd, Levine, and Smith (2001) point out that inflation leads to a lower volume of loans.

In term of economic model, previous research demonstrates that imperfect competition in the financial market has a significant impact on economic activity. For example, Ruckes (2004) applies Bertrand competition in the presence of asymmetric information to study the interactions between the screening activity of banks and prices in the credit market. Furthermore, Paal, Smith, and Wang (2005) develop an endogenous growth model to study the impact of financial competition on economic growth. Interestingly, they point out that banking concentration may be growth-enhancing.

THE MODEL

I consider a discrete-time economy populated by an infinite sequence of two-period lived overlapping generations, plus an initial old generation. In particular, the economy consists of two geographically separated islands. Private information serves as the primary trade friction in the economy. In each period, a fraction of young agents must move to the other island. The probability of relocation, π, is exogenous, publicly known, and the same in each island.

An Economy with Financial Intermediation

There are N identical banks in operation in each island. They offer rates of return (r_t^m, r_t^n) to depositors. With deposits received, they can allocate funds to investment projects which yield $R > 1$ for each unit of goods invested in the previous period. Based upon account balances with one financial institution, depositors also gain access to their funds from any banks. Consequently, they have the ability to provide withdrawal services based upon requests of non-customers. However, depositors pay bank service fees, P units of consumption goods, for processing their requests of withdrawal. In this manner, the provision of electronic transaction service is effectively similar to ATM or debit card services.

From the perspective of relocated individuals, withdrawal services offered by each bank are the same. As a result, the service fee per unit of payments will be the same across banks. In this manner, if a mover obtains m_t units of real money balance from a participating bank, a total of $(1+P)m_t$ units of goods will be immediately debited from an agent's account balance. Although banks have the ability to conduct transactions, it is not costless for them to perform these services. In particular, when an agent seeks to acquire m_t units of real money balance, the costs of processing transactions are given by Cm_t units of goods. From the perspective of relocated individuals, withdrawal services offered by each bank are the same. As a result, the service fee per unit of payments will be the same across banks. In this manner, if a mover use electronic transaction service from a participating bank, the amount of currency and service fee will be immediately debited from an agent's account balance.

Agents

Banks can offer a schedule rate of return so that all agents deposit all of their funds in banks. Therefore, the total amount of deposits in each location is given by:

$$d_t = x \tag{1}$$

Consequently, the inverse demand curve for the total amount of withdrawals is:

$$P = \frac{\pi r_t^m x (1+\sigma) - m_t^d}{m_t^d} \tag{2}$$

The Market for Electronic transaction service

By providing electronic transaction service to customers of other banks, each financial institution receives service fees and incurs operating costs. In particular, if relocated depositors debit m_t unit of goods from their accounts, the bank's total revenues and total costs are $P(m_t^d)m_t$ and Cm_t respectively. In order to maximize profits, each bank offers the amount of electronic transaction service such that:

$$m_t = \left(\frac{N-1}{N}\right)\left(\frac{1+\sigma}{1+C}\right)\pi r_t^m \frac{x}{N} \tag{3}$$

The Effect of Banking Competition on the Use of Electronic transaction service

The effect of banking competition on the provision of electronic transaction service of each bank can be demonstrated as:

$$\frac{\partial m}{\partial N} = -\frac{(N-1)}{N^3}\left(\frac{1+\sigma}{1+C}\right)\pi R x \tag{4}$$

When the banking sector is more competitive, banks posses less market power. As a result, given the account balances of movers, each bank offers a high volume of electronic transaction service. However, In order to better understand the effects of degree of banking competition, I analyze the portfolio choices of the banks. Specifically, an increase in competition leads to a lower amount of deposits per bank. Thus, less funds are allocated to each individual's account balances at a particular depository institution. Moreover, the effect of financial competition on the amount of deposits dominates the impact of banking competition from less market power. In this manner, a higher degree of competition causes each bank to provide a lower amount of electronic transaction service.

At the aggregate level, the effect of banking competition on the aggregate volume of electronic transaction service is:

$$\frac{\partial m^d}{\partial N} = \left(\frac{1}{N^2}\right)\left(\frac{1+\sigma}{1+C}\right)\pi R x \tag{5}$$

An increase in competition can lead to a lower amounts of deposit and electronic transaction service per bank. However, the effect of financial competition on the amount of deposits is dominated by the impact of an increase in banking competition. As a result, at the aggregate level, a higher degree of competition results in a higher amount of electronic transaction service.

The Effect of Transaction Costs on the Use of Electronic transaction service

The impact of transaction cost on the provision of electronic transaction service of each bank can be shown as:

$$\frac{\partial m}{\partial C} = -\left(\frac{N-1}{N}\right)\frac{(1+\sigma)\pi R x}{(1+C)^2 N} \tag{6}$$

Interestingly, when the cost of processing electronic transaction service is lower, each bank offers more electronic transaction service. In particular, the decrease in cost of providing electronic transaction service allows each bank to perform electronic transaction service more efficiently. Consequently, they offer a higher amount of electronic transaction service. Thus, the banking sector should develop new technology system consistently to lower transaction costs so depositors gain more access to electronic transaction service.

By considering at the aggregate level, the effect of transaction costs on the use of electronic transaction service can be demonstrated as:

$$\frac{\partial m^d}{\partial C} = -\left(\frac{N-1}{N}\right)\frac{(1+\sigma)\pi R x}{(1+C)^2} \tag{7}$$

When the cost of processing electronic transaction service is lower, each bank offers more electronic transaction service. Thus, the aggregate amount of electronic transaction service increases.

The Effect of Inflation on the Use of Electronic transaction service

I begin the analysis by considering the effect of inflation on the provision of electronic transaction service of each bank.

$$\frac{\partial m}{\partial \sigma} = \left(\frac{N-1}{N}\right)\left(\frac{\pi R}{1+C}\right)\frac{x}{N} \tag{8}$$

An increase in inflation leads to the lower value of real money balances. Depositors are risk averse. They want to get more insurance in the bad state. The principal economic function of banks is to provide opportunities for consumption insurance - since individuals are risk averse, they would prefer a consumption stream with less variability. Individuals face the problem of limited participation in financial markets. The bank provides depositors with access to the market for money and long-term investments. Banks serve this role well — in standard random relocation models such as Schreft and Smith (1998), banks acquire a diversified portfolio of assets. Consequently, individuals obtain higher consumption in the bad state (when the liquidity shock occurs) in exchange for less consumption in the good state (when agents do not experience the liquidity shock, they are non-movers). For a given portfolio of asset holdings, banks will choose to acquire greater money balances. In this manner, a depositor's consumption in the bad state will not fall as much. As a result, banks offer more electronic transaction service.

At the aggregate level, the relationship between inflation rate and electronic transaction service can be seen as:

$$\frac{\partial m^d}{\partial \sigma} = \left(\frac{N-1}{N} \right) \left(\frac{\pi Rx}{1+C} \right) \tag{9}$$

When the rate of inflation is higher, each bank provides more electronic transaction service. Thus, the aggregate amount of electronic transaction service increases.

The Interactions between the Degree of Banking Competition and Transaction Costs on the Use of Electronic transaction service.

The Interactions between the Degree of Banking Competition and Transaction Costs can be illustrated as:

$$\frac{\partial m^2}{\partial N \partial C} = \frac{(N-1)(1+\sigma)\pi Rx}{N^3 (1+C)^2} \tag{10}$$

The effect of banking competition is stronger when the transaction costs decrease. To be specific, a decrease in the unit cost of providing electronic transaction service allow banks to operate electronic transaction service more efficiently. Therefore, new banks have more incentives to enter to the market. Thus, the effect of financial competition is stronger.

At the aggregate level, the Interactions between the degree of banking competition and transaction costs is shown by:

$$\frac{\partial m^{d2}}{\partial N \partial C} = (-1) \left(\frac{1+\sigma}{N^2 (1+C)^2} \right) \pi Rx \tag{11}$$

As demonstrated in the previous result, the effect of financial competition on the amount of deposits is dominated by the impact of banking competition from higher market power. As a result, a higher degree of competition results in a higher amount of electronic transaction service. Furthermore, banks provide electronic transaction service more efficiently when the transaction costs are low. Consequently, the effect of banking competition is stronger when the transaction costs decrease. Therefore, the aggregate level of electronic transaction service increases even more.

The Interactions between Inflation and Transaction Costs on the Use of Electronic transaction service.

I show that an increase in the rate of inflation can result in more electronic transaction service provided by each bank. Moreover, the impact is magnified as demonstrated by equation (12).

$$\frac{\partial m}{\partial \sigma \partial C} = (-1) \left(\frac{N-1}{N} \right) \left(\frac{\pi R}{(1+C)^2} \right) \frac{x}{N} \tag{12}$$

Depositors are risk averse. The principal economic function of banks is to provide opportunities for consumption insurance. Consequently, banks will choose to acquire greater money balances when inflation is higher. Furthermore, when the transaction cost in the electronic transaction service is lower, banks operate electronic transaction service more effectively. In this manner, the effect of inflation on

electronic transaction service provided by each bank is stronger when the banking sector achieves productivity in the electronic transaction service market.

At the aggregate level, the Interactions between inflation and transaction cost is illustrated by:

$$\frac{\partial m^{d2}}{\partial \sigma \partial C} = (-1)\left(\frac{(N-1)\pi Rx}{N(1+C)} \right) \tag{13}$$

At the high level of inflation, each bank provides more electronic transaction service. Furthermore, the productivity in the electronic transaction service allows banks to offer more electronic transaction service. In this manner, the effect of inflation on the aggregate amount of electronic transaction service is stronger when the cost of providing electronic transaction service decreases.

CONCLUSION

The results show that a higher degree of competition results in a higher aggregate amount of electronic transaction service. Interestingly, the effect of banking competition is stronger when the transaction costs decrease. In addition, when the cost of processing electronic transaction service is lower, banks offer a higher amount of electronic transaction service. Furthermore, an increase in inflation rate results in a higher amount of electronic transaction service. In this manner, banks should compete more in the market for electronic transaction service and develop new technology system consistently to lower transaction costs. Consequently, depositors will gain more access and use more electronic transaction service.

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