Review of Microeconomic Research on Bank Behavior: Theory and Application

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Abstract. This paper begins with an introduction to the theory of microeconomics of banking, followed by a presentation of the development course of researches on bank behavior and a survey of the various theoretical models, and concludes with a discussion about the extension and application of the Klein-Monti model to the current status of oligopoly banking markets.

Introduction

Whilst financial markets has played an increasingly significant role in the financial system over the last few decades, banks are none the less indispensable institution to allocate resources. An analysis of bank behavior is practically analyzing the strategic decision made by individual banks under the assumption of obtaining the maximum profit which is conducive of us to comprehend the management and operation of commercial banks and the impact of other factors on decision making. The behavior analysis of commercial banks has been constantly replenished and innovated over the past four decades.

The Development of the Research on Bank Behavior

The research on the behavior of commercial banks is gradually improved with the continuous integration of new economic theories.

Before the early 1970s, the microeconomics theory of banks was not exist(Freixas and Rochet(2008)[1]).At that time, Arrow-Debreu paradigm which was proposed by Arrow(1953) and Debreu(1959) is the mainstream algorithm in the filed of microeconomics. However, this general equilibrium model cannot be employed for analyzing the banking firm since it suggests that banks are redundant institutions in complete financial markets. Hence, making a logical explanation for the existence of bank serving as a financial intermediary becomes an important issue to discuss in academia.

One view regards transaction costs leads to the justification for financial intermediaries(Benston and Smith(1976)[2]).Gurley and shaw (1960)[3]argue that banks and some other financial institutions are there to transform financial contracts and securities, they can carry out investment and management of securities at a cost lower than their clients by scale economy vantage. This view has also been supported by Benston and Smith(1976),Mishkin(1978) and Kane and Buser(1979),they propose that the justification for the existence of financial intermediaries is the presence of costs.

Moreover, other studies find that the theory of asymmetric information started with Akerlof, Spence and Stiglitz can also be used to prove the justification for an intermediary. Leland and Pyle(1977)[4] and Ramakrishnan and Thakor(1984)[5] find that it will be beneficial if agents can engaged in the production of information to form coalitions under conditions of moral hazard. Furthermore, Ramakrishnan and Thakor(1984) point out that the usual appeal to transactions costs to explain intermediation is not needed. The asymmetric information theory leads to an identification of conditions sufficient for the existence of banks as financial intermediaries. For this reason, it has been the starting point for a number of studies on the microcosmic issues about banking.

Early research on the behavior of commercial banks is how to achieve profit maximization in a given external environment. According to the view of tradition microeconomics, it is generally assumed that the firm usually obtains the maximum profit by selecting the output level by the

principle that marginal cost equals to marginal revenue in perfect competitive market. However, the pure form(perfect competition or monopoly) is rare in the real world,models based on it cannot accurately depict the real market situation in most cases.

To solve this problem, Chamberlin and Robinson propose the theory of monopolistic competition in 1933.Chamberlin(1933)[6] points out that most market structurally fall somewhere in between the two extreme forms of market(i.e.perfect competition and monopoly)and discuss monopolistic competition and oligopoly. The theory of monopolistic competition lays the foundation for the analysis of market structure and promotes the development of traditional industrial organization theory. On the basis of monopolistic competition theory, SCP analysis method is developed by Edward Mason and Joe Bain, then optimized by Scherer.SCP approach, namely the structure-conduct- performance industrial organization paradigm, can be employed to discuss the link between market structure, market conduct and market performance. Followers of SCP approach claim that market structure influences market conduct while market conduct influences market performance. Therefore, the SCP paradigm, as one of the main analysis methods of traditional industrial organization theory, is used to analyze the market behavior (i.e.decision-making behaviors in the process of operation) of enterprises in the given market structure. Nevertheless, the SCP paradigm tends to be empirically describing, thus its results are not credible enough. Another drawback of the SCP approach is that it cannot explain the interdependence and interaction between firms which actually do influence the market behaviors in imperfect competition market.

To remedy the above drawbacks, economists create a new industrial organization theory by introducing game theory, information economics and the oligopoly behavior model constructed by Cournot, Bertrand, Stackelberg et al into the theoretical framework. It should be noted that the theory of new industrial organization theory is different from the traditional industrial organization theory using SCP paradigm as the main analysis approach, it emphasizes the use of game theory to analyze the the behavior of oligopoly firms.

Therefore, the micro-level research on commercial bank has made significant progress with the application of information economics, industrial organization theory and game theory in the analysis of bank behavior.

Theoretical Models of Bank Behavior

Since the 1970s,economists have attempted to make exploration on modeling and interpreting bank behavior, and gradually developed substantial theoretical models on the behavior of banking firm. Baltensperger(1980)[7] presents a survey and collates the models of bank behavior in relevant literature.

In this paper, we follow the Baltensperger's classification of bank models, considering those models in two categories: bank portfolio management(partial) model and complete model of the banking firm.

The former only solves the question of the optimal allocation of the portfolio. For instance, the model of optimal asset choice which has been taken up by a variety of writers including Porter(1961),Frost(1971),Pringle(1974),Koskela(1976),Niehans (1978)focuses on the bank's reserve and liquidity management decision. In a nutshell, the partial models generally treat the asset choice or liability management decision as a problem of inventory optimization, it cannot explain the determination of the total scale of bank's operation while complete models of the banking firm can. There are several types of the complete models with their own research emphases. The risk aversion models, for one, treat the problem of bank for profit maximization with the assumption of caring about risk and subjective risk aversion, represented by Pyle-Hart-Jaffee model established by Pyle(1971) and Hart and Jaffee(1974).Although this market risk management model constructs a new analysis framework for describing bank behavior, its basic assumptions about complete information and perfectly competitive market are quite unrealistic. As another example, real resource models(essentially a bank production cost model)have been utilized by many authors such as Pesek(1970),Saving(1977),Towey(1974),Sealey and Lindley(1977),regarding the actual resource cost of banking services as a key factor to study bank behavior. And the monopoly model represented

by Klein-Monti model is a seminal bank behavior model proposed by Klein(1971)[8] and Monti(1972)[9],studies the optimal behavior of banks in oligopoly market. A large number of economists hold the view that the banking market is oligopolistic and thus prefer to use this model to consider the bank behavior.

The Extension and Application of the Klein-Monti Model

Since oligopoly to some extent is a characteristic of the world's banking markets,many analysis models based on the assumption of complete competition market can not be used in the study of bank behavior. Thus, the Klein-Monti model based on the oligopoly market has attracted many economists to perfect and extend it(e.g.Dermine(1986)[10],Prisman, Slovin and Sushka(1986)[11]).And then, applying to the analysis of the policy's effect on banks behavior.

Many papers investigates the effect of monetary policy on bank behavior. Some of them focus on the interbank rate. Freixas and Rochet(1997)[12] analyze the effect of changing interbank rate on optimal bank behavior without scope economics existing. However, Toolsema and Schoonbeek (1999)[13] find the result of Freixas and Rochet (1997) can be different if the asymmetries was introduced into the cost function or the way of conduct. Furthermore,some studies(e.g. Hirota and Tsutsui(1992),Kashyap, Rajan and Stein(1999)) demonstrate that scope economics do exist between loans and deposits.Yamazaki and Miyamoto(2004)[14] extend the model of Freixas and Rochet(1997) and show that scope economics can overturn the findings of previous studies. Using the above model, Varelas(2008)[15] makes a further analysis of the effect of interbank interest rates on bank-clients consumption. Some researchers lay emphasis on studying the effect of deposit reserve requirement on optimal bank behavior with their own emphasis. The researches on how the optimal interest rates and volumes varies with reserve rate are made by Yamazaki and Miyamoto(2004), Dalla, Karpetis and Varelas(2014) and Lu Zhang(2013).Sumarti and Gunadi(2013)[16] construct a dynamical system of bank's loan and deposit based on the bank profit equation by Monti-Klein and discuss the strength of reserve requirement in terms of the behaviors of the solutions. Ming Feng and Ge Wu(2015)[17] take the case of directed reserve requirement ratios cut to explore the mechanism of targeted monetary policy by a bank oligopoly model.

There are also vast literature considering an imperfect competition model of banks to analyze the effect of the presence of regulation. Baglioni and Cherubini(1990) and Fanti(2012) et al adapt a version of Klein-Monti model extended to embody capital requirement and discuss how the capital regulation changes the optimal bank behaviors. Yan Wang(2006)[18] studies the the optimal decisions of the bank respectively under the condition of the restriction of interest rates or the limitation of deposit reserve by models supplemented with liquidity risk. Many papers have explored the response of bank behavior to interest rate policy(e.g.Li Wang and Chu-lin Li(1999)).Yang Ji, Jian-wei Xu and Bin Zhang(2015)[19] set a dual-track interest rate model extended from Klein-Monti model to analyze the effect of interest rate liberalization(Specifically, the effect of relaxing restrictions of deposit interest rate)in China.

In addition to the above-mentioned applications in monetary policy and regulation with the framework of an oligopolistic version of the Klein-Monti model, researchers have extended the applications to many types of problem studies, such as the effects of leadership in banking analyzed by Porras (2008),the impact of banking competition on the effectiveness of monetary policy transmission discussed by Deriantino(2013),and the incidence of bank tax investigated by Capelle-Blancard and Havrylchyk(2013).

Summary

According to the survey we find that microeconomic studies on the behaviors of banks has developed rapidly in the the last four decades with the full absorption of the latest theories and methods such as information economics, industrial organization theory and game theory etc.

In the circumstances of banking oligopoly competition, the classic bank behavior Klein-Monti model has been employed by many authors and its application is widened, helping us to analyze how

some significant factors such as various policies, the introduction of new supervision measures or the market environment changes influence the optimal bank behavior and providing the valid recommendations according to the research results.

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