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An empirical study on credit card loan delinquency

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ABSTRACT

Following the Basel II convention, consumer credit default is commonly defined as delinquency beyond a period of 90 days. In this study, rather than considering default as a binary variable, we dissect delinquency states further to investigate default behavior in greater detail. As such, we define three states—no delinquency, delinquency and serious delinquency—and estimate the probabilities of the transitions between states using extensive panel data from Korea, covering a wide range of behavioral information. Our findings have several economic implications. First, the factors that affect delinquency risk can differ from those that affect the transition from delinquency to serious delinquency. Second, the recent increase in the number of seriously delinquent accounts can be attributed to changes in the borrower age distribution. Third, macroeconomic conditions, especially differences in gross domestic product and consumption growth, have led to the recent increase in delinquent accounts. Fourth, the debt-to-income (DTI) ratio has a profound effect on transitions between delinquency states and thus affects both recovery and delinquency. Furthermore, this result is robust to controls for demographic and macroeconomic factors.

1. Introduction

Credit card loans, on which the interest and limits are determined by the borrower's credit card usage, are a primary component of household debt. Unlike a mortgage, this type of debt is unsecured and depends only on the borrower's credit. Credit card loans are widely used in Korea because they are easily accessible and because their interest rates (15–25%) are lower than those of other types of unsecured loans. However, the loan periods of one to three years are short and therefore require relatively large monthly payments. These characteristics (i.e., unsecured and large monthly payments) make assessing their credit risk particularly important.

As Kovrijnykh and Livshits (2017) point out, consumer credit default is not a binary variable. Delinquency, often defined as payments being overdue for more than 60, 90, or 120 days, is considered the first stage of default. If Chapter 7 filings data are not available, consumer credit default is commonly defined as a payment that is three months overdue, following the Basel II convention. In this case, delinquency of less than three months is often regarded as a sign of default because people tend to consider delinquency and default as being caused by the same factors. However, in Korea we observe that the default rate continues to rise even though the delinquency rate has increased more gradually. This is interesting because the trends have not been accompanied by an increase in the probability of delinquency. As a result, a borrower's delinquent behavior might differ from his or her default behavior. Therefore, we hypothesize that the factors that affect delinquency differ from those that affect the transition to default (i.e., serious delinquency). We further hypothesize that a factor exists that reduces the delinquency rate, while increasing the default rate. To test our

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hypotheses, we do not solely investigate the default rate. Many studies that focus on default behavior treat the default "state" as a binary variable (e.g., Gross and Souleles, 2002; Agarwal and Liu, 2003; Bellotti and Crook, 2013; Debbaut et al., 2016). In contrast, we dissect the default state into three delinquency states, and then focus on the transitions between them.

In this study, we examine delinquency in credit card loans in Korea by exploiting a unique account-level dataset of the credit card loan market. Using our quarterly observed panel data, we track not only changes in delinquency status, but also changes in account and borrower characteristics, including information related to jobs and income. Consumer credit scoring models predominantly use static information about obligors at the time of application to measure each account's credit risk, and cannot capture changes in default risk over time. Behavioral consumer credit scoring models can capture changes in default risk by using variables that are fixed at the time of estimation, but that change over time. These types of dynamic models allow us to use panel data and variables that change over the estimation period. Ma et al. (2010) and Thomas et al. (2001) argue that dynamic rather than static models should be used in order to fully understand default risk. Furthermore, dynamic models can incorporate macroeconomic variables and time-varying behavioral variables. Macroeconomic variables allow us to capture the empirical implications of default risk in the event of an economic crisis.

This study contributes to the existing literature in several ways. Using unique account-level credit card loan data, we build and investigate a model that measures delinquency risk. Then, we estimate the transition probabilities between delinquency states, investigate which characteristics affect delinquency risk, and examine the features common to accounts that have recovered from delinquency. Because the data are observed quarterly, we also investigate how changes in borrowers' credit ratings, debt-to-income (DTI) ratios and employment status affect delinquency risk. Our results support the view that the delinquency state is viewed as a transitory state, as indicated by Herkenhoff (2012) and Chatterjee (2010), rather than as an absorbing state, as indicated by Drozd and Serrano-Padial (2017). Unlike other studies that define delinquency as payments overdue for more than 90 days, we also examine short-term delinquencies of less than 90 days. Our results show that the factors that cause delinquency are different from those that prolong delinquency. In addition, we use credit card loan data from Korea, which is one of the major emerging economies. As Park (2009) points out, the consumer credit market in Korea has several unique characteristics compared to markets in other developed countries. Our results provide several policy insights, and the study can serve as a reference for readers in other countries interested in household debt.

This paper is organized as follows. Section 2 discusses the consumer credit market in Korea in further detail. Section 3 reviews the current research on credit card loan delinquency risk and develops our hypotheses, while Section 4 describes our data and variables using summary statistics. Section 5 details the methods used for our empirical estimations of the transition probabilities between delinquency states. Section 6 presents the empirical results and, finally, Section 7 concludes the paper.

2. The consumer credit market in Korea

In 2002, Korea experienced an unprecedented credit card crisis. Credit card companies had issued their memberships competitively, which increased the number of credit card holders with poor credit. Credit card usage for purchases and cash advances reached 623 trillion Korean won (KRW) in 2002, with the crisis eventually leading to delinquency for 4 million borrowers. As a result, by 2004, credit card usage had fallen to 357 trillion KRW. The credit card crisis in Korea shares many similarities with the recent financial crisis in the United States. Household debt reached 1 quadrillion KRW in the second quarter of 2013 and, in 2014, credit card usage reached 564 trillion KRW. Credit cards continue to grow in popularity as a method of payment. Fig. 1 shows the total credit card loan amount as a percentage of the gross domestic product (GDP) in Korea. During the credit card crisis in 2002, this measure peaked at over 7% before dropping drastically; recently, however, it has begun increasing again.

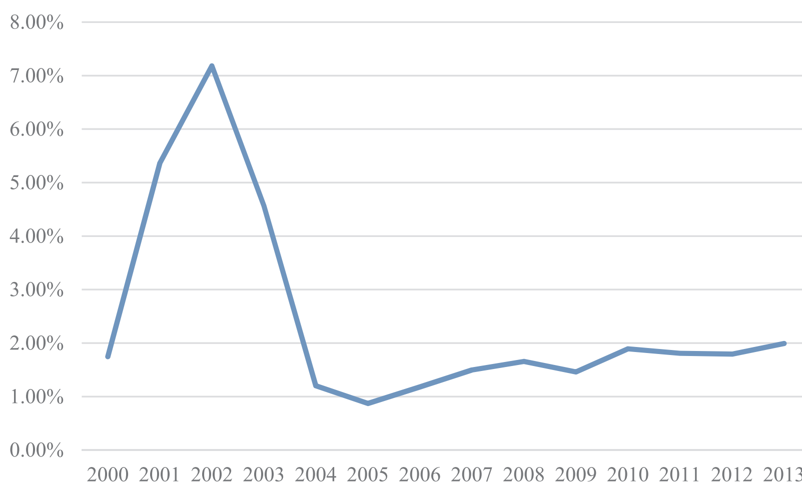

Fig. 1. Credit card loans as a percentage of GDP in Korea.

Notes: This figure shows total credit card loans as a percentage of GDP in Korea. The statistics are measured on an annual basis.

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