

Paper submission for 'Credit Scoring and Credit Control Conference XVI'

Full title:	The impact of credit limit on credit card expenditure and risk of default or persistent debt
Article Type:	Original Research
Keywords:	Credit limit; Credit expenditure; Risk of default; Risk of persistent debt; Systematic minimum repayment behaviour; Zero-adjusted Gamma Regression Model (ZAGA)
Corresponding Author:	MARYAM REZAEI m.rezaei@soton.ac.uk University of Southampton Southampton, United Kingdom
Authors Information:	Maryam Rezaei Email: M.rezaei@soton.ac.uk Phone: +44 749 186 9900
	Dr Mee Chi So Email: M.So@soton.ac.uk Phone: +44 23 8059 8964
	Professor Christophe Mues Email: C.Mues@soton.ac.uk Phone: +44 23 8059 2561

Abstract:

A key policy decision that credit card lenders need to tackle is granting appropriate credit limits to their customers. The credit limit should be consistent with the financial capacities of each customer and consider both the profitability and risk implications. On the one hand, offering higher credit may encourage customers to increase the amount of their spending but it may also increase the risk of persistent debt or eventually, default for some segments of customers.

In this paper, we intend to investigate the impact of the credit card limit on customers' expenditure and risk of default or persistent debt. We use a real-life dataset from a major bank in Hong Kong with more than one million accounts' monthly credit card use from 2002 to 2007. Since there was an economic recession in Hong Kong during this period, we also look at the difference in consumer spending/risk and its relation to the credit limit during and after the recession.

We consider different models such as ordinary least squares regression and zero-adjusted Gamma regression to examine the impact of credit limit on spending along with other factors such as credit balance, customers' previous payments, behavioural score and time on book. We will demonstrate how the proposed methods are useful for customer segmentation and how they can inform the lender's credit limit policy.

1. Definitions:

A recent FCA Study (FCA, 2017)¹ identifies four different arrears-based indicators of potentially problematic credit card debts:

- 1) **Severe arrears:** Consumers whose debt amount is unlikely to be collected and have been charged-off.
- 2) **Serious arrears:** Consumers who have missed three or more repayments and are going to default.
- 3) **Persistent debt:** Consumers that have an average credit limit utilisation of 90% or more while also incurring interest charges are categorised as being in persistent debt. Alternative thresholds for defining persistent debt include a 50% or 75% utilisation rate.
- 4) **Systematic minimum repayments:** The last arrears type are consumers that have made nine or more minimum repayments over the course of the year, while also incurring interest charges.

2. What will be presented at the talk:

Several models will be proposed to examine the impact of **credit limit** on credit card holders' purchasing amount, systematic minimum repayment behaviour, the risk of default and the risk of being in persistent debt.

- To the best of our knowledge, this paper is one of the first studies into modelling card expenditure instead of card balance. Moreover, this would be the first academic paper exploring systematic minimum repayment behaviour and forecasting the risk of persistent debt.
- The drivers of this study are:
 - FCA's obligation for credit card lenders to identify customers at risk of financial difficulty and take appropriate action by earlier intervention
 - The importance of accurate revenue prediction, credit limit allocation strategy and optimal customer risk management for credit card lenders.
- We propose a Zero Adjusted Gamma Model for predicting the customers' total purchase amount over the next 12 months and compare it with an OLS regression model.
- For predicting the risk of default, persistent debt and systematic minimum repayment, we propose three different logistic regression models.

¹ The Financial Conduct Authority (FCA), (2017). *Credit card market study: consultation on persistent debt and earlier intervention remedies*. London: Consultation Paper.

- We have tested and evaluated the performance of our models by applying them on a large real-world dataset including over 150000 Hong Kong credit card accounts and compared the parameters estimation.
- We will explain the behavioural and application variables we have used in our models.
- We will explain the impact of credit limit variation on different response variables, as well as interpreting other predictors' coefficient signs and significance or spline graphs.
- We will consider the percentage of customers who are in different thresholds of persistent debt, compared with the percentage of customers who are in default at the same time, to analyse the relation between these alternative response variables.