Analysis of Yirendai Borrower Applications

Objective

The Chinese online peer-to-peer lending sector is part of the broader online consumption lending sector, one of the cornerstones of China's attempt to derive a large proportion of growth from domestic consumption rather than exports. Being a nascent sector, it has grown by leaps and bounds in an unregulated, demand-driven environment. Out of the ~8000 online lending firms, we try and analyse Yirendai's loan characteristics.

Yirendai defines its borrowers as "prime", mostly urban and salaried. This document is aimed at analysing the claim in detail. One specific objective is understanding repayment capacity of borrowers (defined as debt-to-income ratio), information lacking in Yirendai's financials.

Note: This is meant simply as an academic exercise and should be treated as such. It is not a financial recommendation, and is not to be used in any commercial decision-making.

Summary

Key takeaways from sample data:

1) Long-term (36-month tenure) loans make up a significant proportion of loans across income groups (Page 2)
2) Yirendai classifies borrowers by their proprietary credit scoring algorithm. Grade D loans (lowest quality borrowers) make up ~83% of total volume, and are presumably extended to borrowers with 0–50k RMB annual income (Page 4); the estimated debt-to-income ratios looks unsustainable (~0.8-1.3) (Page 5)
3) There are some operational inefficiencies which might point to lapses in internal policy control (Page 5)

Information

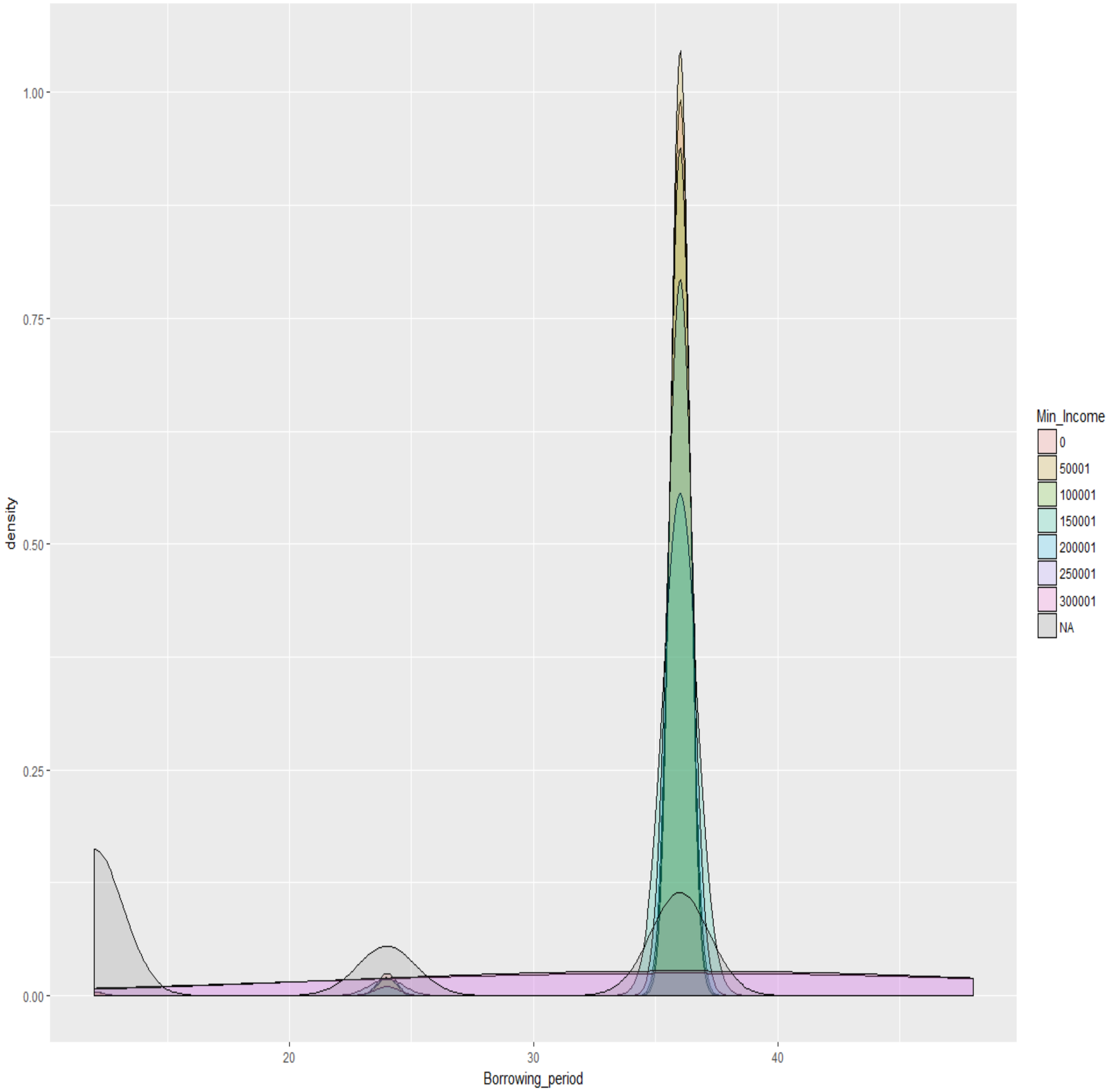
The dataset was obtained from the company's webpage and consists of information on ~45,000 unique borrowing applications from the period 8th-30th August 2017, each with 17 features including transaction-related details (loan amount, tenure, interest rate, purpose) and personal details (marital status, gender, education, income, credit card limits). To be noted:

1) Data has been cleaned and translated from Mandarin; some details are assumed to have been lost in translation
2) Details are with regards to loan *applications*, not loans originated. It is possible that some applications don't go through. A random check yields 98% of loans were facilitated
3) Many of the applications (~77%) do not disclose details like incomes and credit card limits on the website; such data points are still considered unless stated explicitly

[Sanity check: To confirm sampling accuracy, the sample average tenure and loan amounts were compared with Management Commentary & were found to be nearly identical. (30.1 v/s 30 months, 62.2k v/s 60k RMB)]

Observations

<u>Loan Tenures</u>



<u>Chart 1</u>: Borrowing Period Distribution for level of Minimum Borrower Income (Annual, in RMB)

Most loans originated in the sample, across income groups, were for 36 months. However, for applications with undisclosed income information, most loans were originated as 12/24 month loans (the greyed peaks on the left) – without further information, it is difficult to understand the implications of this observation; however, it is fair to assume that some of these are "Fast-Track" cash loans with lower credit checks and faster approvals.

Graphical representation of loan amounts, split across tenures and income groups

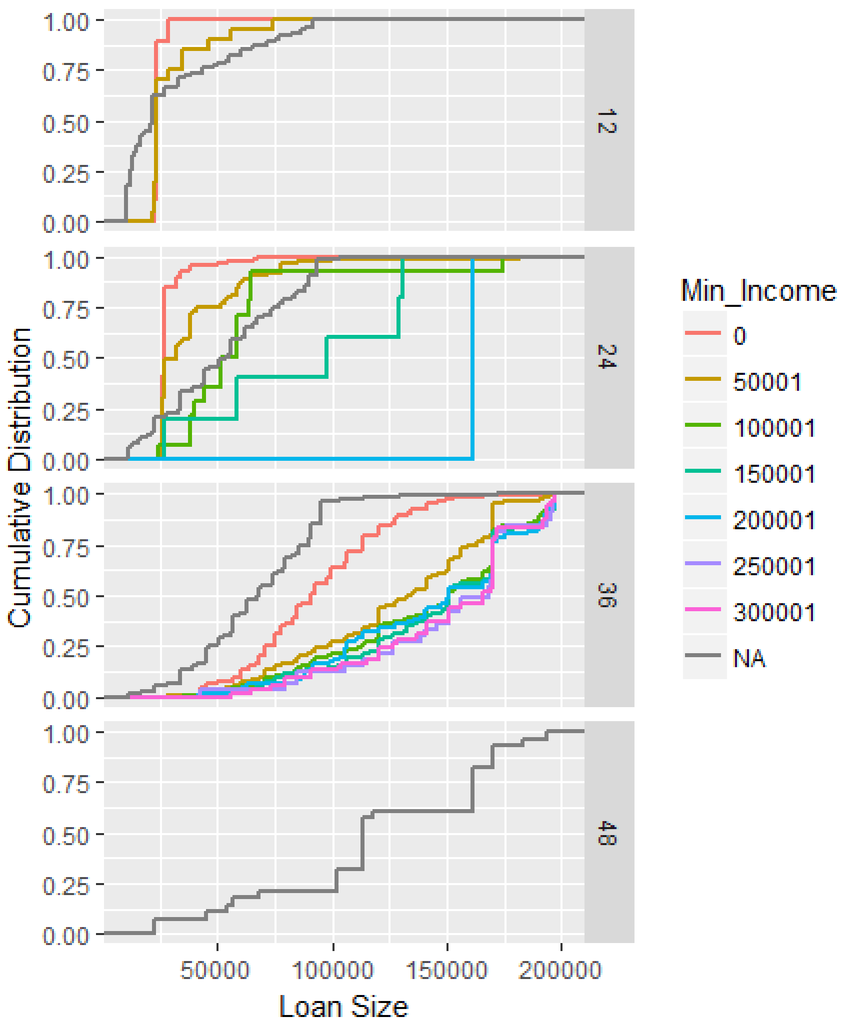


Chart 2: Cumulative Distribution chart for Loan sizes for each (loan tenor, Minimum Income) combination. [The way to read this chart is best illustrated by an example: If I want to know what % of loan applications were under 100,000RMB for borrowers with minimum income of 50,000RMB & a loan tenure of 36 months, I would look at the golden line in the tab numbered "36". The y-axis value corresponding to 100,000 on the x-axis (~0.25) answers the question]

In Chart 2, it is interesting to note that ~40% of people in 0-50k RMB income group needing 36 month loans have taken loans of more than 100,000 RMB. From company financials, the average APRs (Annual Percentage Rates) of the income group are estimated to be ~40%. At such high rates, loan sizes more than twice their income levels seem a little too large; a more formal approach is given below

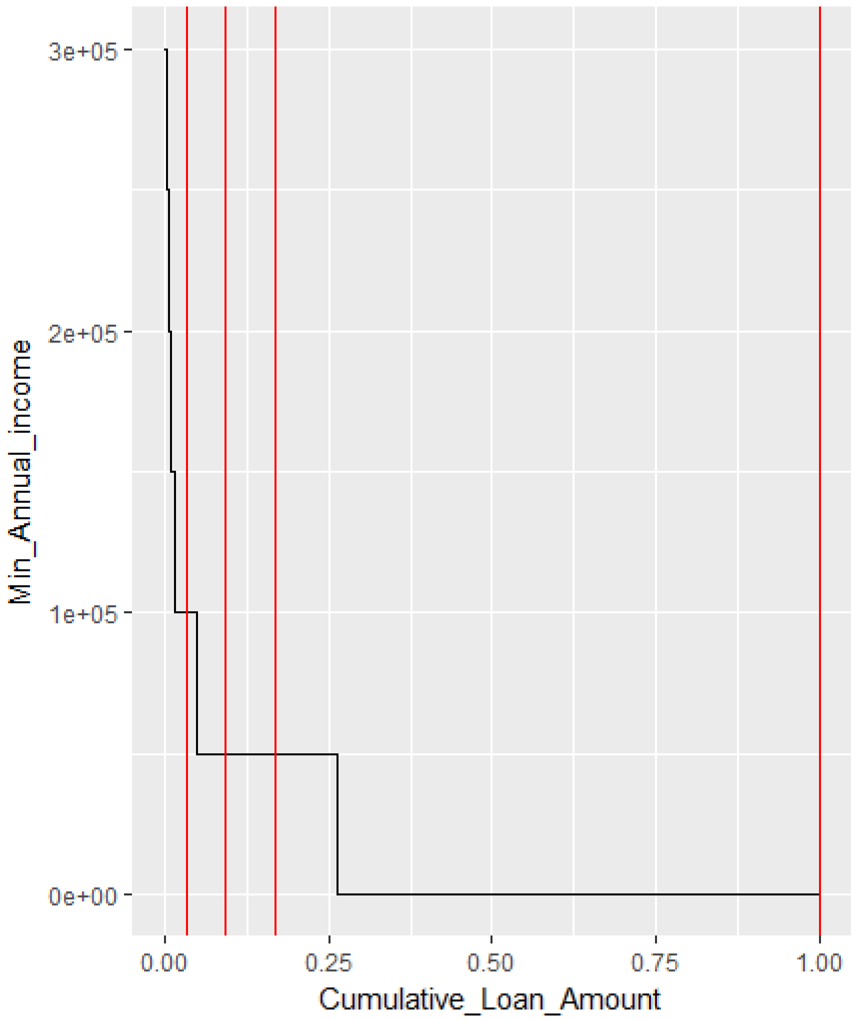


Chart 3: Cumulative Distribution chart for Loan Amount v/s Min_Annual_Incomes

As per the company, their loans are divided into 4 grades (A-D with loan volume split of [3.5%, 5.8%, 7.4%, 83.3%]). Assuming a one-to-one relationship of borrower incomes with grades, each red line above represents the bifurcation of loans into respective grades. As an example, Grade A loans are given out to people with minimum annual incomes of 100k RMB. An important point is that *most Grade D loans* are given out to income categories within the range of 0-50k RMB.

Estimation of Debt-to-Income ratios by income groups

Annual_income ('000 RMB)	Debt-to-income (Midpoint of income range)	Debt-to-income (Top of Income Range)	# of Loan Applications
0 - 50	1.94	0.97	4765
50 - 100	0.88	0.66	4770
100 - 150	0.58	0.48	689
150 - 200	0.43	0.38	157
200 - 250	0.34	0.31	82
250 - 300	0.29	0.27	33
300+	0.24	0.22	54
Weighted Average	**1.32**	**0.78**	

Table 1

The final exhibit shown in Table 1 is the estimated Debt-to-income ratio for each income group. Debt-to-income is defined as ratio of annual payments (interest + transaction fees + partial principal payment) divided by annual income

Further details that went into the above calculations are:

1) Only applications with *fully disclosed data* are being considered
2) For DTI calculations for midpoint of income range, incomes for each group are considered to be midpoints; eg. for 0-50k RMB, income is considered to be 25k
3) Transaction fees (charged by Yirendai) are ~22%, obtained from latest filings, and are assumed to be paid along with the interest (not through upfront payments)

The chief observation here is that the lowest income groups which have the highest number of applications, also have the worst debt-to-income ratios. This number has upside risk, since lowest income groups are likely to pay above average transaction fees.

Internal Policy Control

"As a matter of policy, we do not permit borrowers to hold more than one loan that has been facilitated through our platform at a time" – Yirendai Prospectus.

However, in data from 22 days, one can find 2 cases where borrowers have taken out multiple loans. Although the practice isn't illegal, it raises questions on internal policy control. For a firm growing at a large scale, it can be a little disconcerting.