nonPRIME101

Report 6

The CFPB Five Percent Solution:

Analysis of the Relationship of Payment-to-Income Ratio to Defaults in Online Installment Loans

The CFPB Five Percent Solution:

Analysis of the Relationship of Payment-to-Income Ratio to Defaults in Online Installment Loans

By: nonPrime101 Small Dollar Markets Research Team

September 10, 2015

Introduction

In its recent outline of proposed regulations, the CFPB suggested it may allow a "safe harbor" from underwriting requirements for "covered" installment loans. Along with other criteria, the "safe harbor" loans will have payments that do not exceed five percent of a borrower's paycheck for the period in question. nonPrime101 decided to examine the CFPB's proposed "five percent solution," applying it to historical records of a large number of online installment loans.

nonPrime101 has access to millions of online installment loan records from Clarity Services' production database, so we thought it might inform the public debate to test whether payment-to-income (PTI) ratio is related to the likelihood of financial harm from a loan, measured by loan default. The following article summarizes the analysis performed by nonPrime101 researchers to determine what relationship (if any) exists between the PTI ratio and default occurrence in online installment loans. A second, related inquiry was whether first payment default performance is qualitatively different from long-term default.

[1] This post reports the work of Amir Fekrazad, a PhD candidate at University of Texas - Austin, Rick Hackett, a Special Policy Consultant to nonPrime101, and Heather Lamoureux, Research Associate for nonPrime101.

Summary Results

To perform this analysis, we looked at both overall defaults and defaults excluding first payment default and sorted these defined-default groups into "buckets" of PTI ratio. Below is a summary of some of the results from this research.

- The number of loans taken out in our data set is greatest at the 2.5 and 5 percent PTI ratio. These two buckets account for over 50 percent of all loans considered in our sample.

- Default rates remain homogeneous across various definitions of default.

- The portion of defaulted loans in each PTI group reflects the first insight above: the 2.5 and the 5 percent PTI buckets have the largest percentage of defaulted loans. Intuitively one would expect a higher PTI percentage to be associated with a higher default rate. A consumer paying 25 percent of income on a loan is logically more likely to default than a consumer paying five percent of income. This is not the case. Rather, defaulted loans are distributed fairly evenly across PTI buckets.

- The correlation between PTI ratio and default occurrence decreases when the first payment default is excluded in two of our default definition groups.

Data

Our data set consists of online installment loans reported between January 1, 2010 and October 17, 2014, and described by the lender as "payday installment" loans. (See Report #5: "Loan Product Structures and Pricing in Internet Installment Lending: Similarities to and Differences from Payday Lending and Implications for CFPB Rulemaking" for complete dataset description). We originally had 29 lenders in the dataset with 879,469 installment loans. In addition to the information described in Report #5, we added to our dataset lender ID code, lender default indicators and Clarity indicators of defaults, and whether payments received were consistently reported on the loans. Installment loans were used that had 6, 12, 15, 18, 24 or 30 payments. The loans with 6 payments are monthly; the rest are bi-weekly.

Note that our PTI is computed as the ratio of payment amount to lender-reported net monthly income. This computation is not the same as the CFPB payment-to-paycheck (PTP) calculation to be used in determining safe harbor for longer term loans in the outline of proposed regulations. Because most borrowers are paid biweekly and most loans have biweekly payments (see Report #5: "Loan Product Structures and Pricing in Internet Installment Lending: Similarities to and Differences from Payday Lending and Implications for CFPB Rulemaking") the 2.5 percent monthly PTI ratio is a reasonable proxy for a 5 percent PTP ratio.

[2] "Small Business Advisory Review Panel For Potential Rulemakings For Payday, Vehicle Title, And Similar Loans; Outline Of Proposals Under Consideration And Alternatives Considered", CFPB, May 26, 2015.

[3] We have previously reported on the correlation of default rates and a five percent of income safe harbor for payday loans. See Report #5: "Loan Product Structures and Pricing in Internet Installment Lending: Similarities to and Differences from Payday Lending and Implications for CFPB Rulemaking."

Methodology

What is a "default?"

In conducting this analysis we were forced to rely on lender reporting of loan condition, including payment condition and default. Contrast this with our analysis of storefont payday lending, where we were able to rely on the lack of any payment in a certain time period to create a standardized definition of default. This method is described in Report #3: "Predictive Value of Payment-to-Paycheck Ratio in Payday Lending." To control for variability in lender reporting of default, we chose four different approaches to define "default." These definitions allowed us to test the hypothesis (which is our second question) that first payment defaults, which in the Internet lending environment include a significant amount of fraud (as opposed to inability to pay), may be qualitatively different from long term (i.e. credit) defaults. The definitions were:

Lender Defined Default

- **Group 1:** Lender reports loan defaulted or greater than 60 days past due.

- **Group 2:** The subgroup of Group 1 that excludes loans with no payment reported. This subgroup should consist of defaults/severe delinquencies other than first payment defaults (i.e., the consumer made at least one payment).

Clarity Defined Default

- **Group 3:** Clarity detected a default. This is an alternative to the lender-reported payment rating and relies on Clarity's assessment of the outcome of the account. The algorithm may be stated as: overall-default will be true if the amount past due is greater than zero, the account is charged off or the account is reported not current or closed.

- **Group 4:** This is the subgroup of Group 3 that excludes those loans which Clarity captured and reported as a first payment default. This is an alternative computation of defaults (excluding first payment defaults) that relies on Clarity's assessment of whether a first payment default occurred.

The online loan data is not consistently reported across some lenders. We frequently observe loans with no reported payments that are not reported as defaulted. In order to sample lenders who are consistently reporting payments, we computed each lender's percentage of loans with no payments reported that are not shown as defaulted. We wanted a very low percentage for this computation. Our assumption was a lender who shows a loan as not defaulted that also shows no payments is obviously not reporting payments consistently. Therefore, we eliminated lenders for whom this computation yielded a value higher than five percent. We subsequently identified eight lenders that had the lowest no-reported-payment to non-default ratio.

We also excluded lenders which reported more than 40 percent default rate on loans. Given the extremely high interest rates we saw in some of our subsamples in Report #5: "Loan Product Structures and Pricing in Internet Installment Lending: Similarities to and Differences from Payday Lending and Implications for CFPB Rulemaking," we sought to control for lenders whose business model relied entirely on garnering a limited number of payments before nearly inevitable default, reasoning that testing for relevance of PTI ratio would be skewed in a model that defaults with extremely high frequency. We chose an arbitrary cut off of 40 percent overall default rate.

There are 700,758 loans in this subsample, meaning our controls eliminated roughly 30 percent of our sample. Of these loans, 297,685 (42 percent of the subsample) have missing PTI, because either the income or the payment is not reported. The final sample size is 403,073.

Analysis

This analysis examines the question: Does the PTI ratio correlate with default performance? In other words, does an increase in PTI level correlate with an increase in borrower financial distress (default)? Secondly, we had the opportunity to test the question whether the first payment default is qualitatively different than the long-term default, with first payment default possibly signaling fraudulent activity.

To start, we examined the data set structure. Approximately 50 percent of the loans in our sample were in the 0.0 to 5.0 percent PTI buckets. Group 3 (Clarity-reported default) has more loans on average in our sample than Group 1 (lender-reported default). Group 2 and Group 4 are subsets of Group 1 and Group 3 and are therefore smaller. Group 3 always contains the greatest number of loans.

Figure 1

Percent of Loans in Default by PTI Bucket (four definitions of "default")

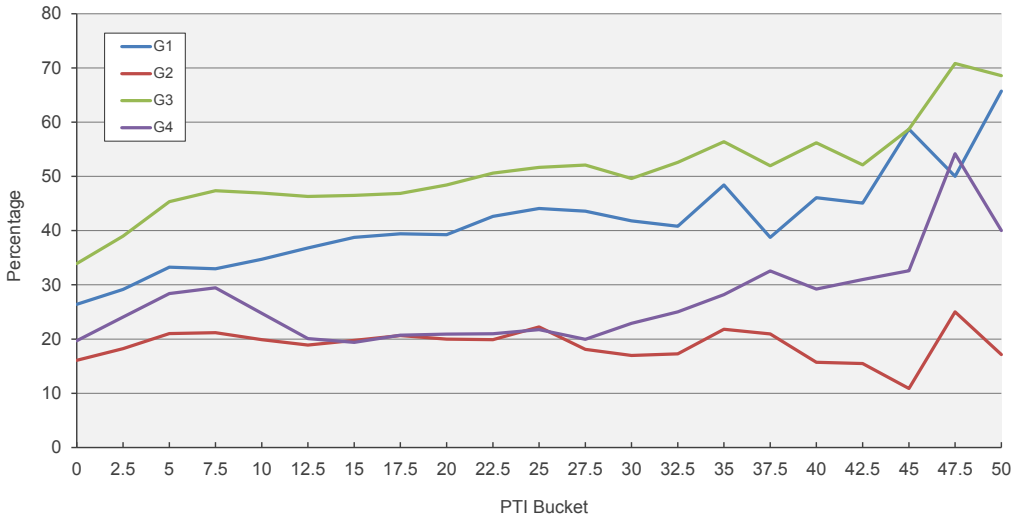


Figure 1 illustrates the composition of the PTI buckets by default group definition. Figure 1 also illustrates something very important; default rates are fairly stable across PTI buckets. Increasing PTI is not a good predictor of increasing default rate. Looking first at defaulted loans excluding first payment defaults, Group 2 default rates (lender reported, excluding first payment defaults) are fairly stable across the entire PTI range. The comparable measure produced by Clarity algorithms, Group 4, is also fairly flat. The measures for all-in defaults (including first payment defaults) do tend to increase slightly as PTI ratio increases, but the relationship is by no means linear. The next step was to determine if there was a statistical correlation between the PTI ratio and the measure of default by definitional group.

Statistical Correlation

To help answer the first question in the analysis (Does the PTI ratio help define the default performance?), our nonPrime101 researcher created a correlation matrix between the two variables, PTI ratio and default by group definitions. The analysis produces four correlation tests corresponding to our four definitions of "default."

Table 1

Pearson Correlation Coefficients, N = 402748

Prob > | r | under H_0 : p = 0	
	pti
G1	r=0.06439
	< 0.0001
G2	r=0.02022
	< 0.0001
G3	r=0.06935
	< 0.0001
G4	r=0.00635
	< 0.0001

In statistics, correlation measures the strength of the relationship of two sets of data. The Pearson correlation coefficient "r" indicates the strength of a linear relationship between two variables, but its value generally does not completely characterize their relationship. Correlation does not signify a causal relation. The relative strength of the Pearson correlation coefficient can be broadly defined as;

- +/- 0.70 to 1.00 –Strong relationship
- +/- 0.30 to 0.69 –Moderate relationship
- +/- 0.00 to 0.29 –Weak relationship

When the four correlations in Table 1 were measured, all showed a very weak relationship based on the above guidelines and the r-values generated. The second measure is significance (<0.001). The correlation measure is significant (to a 0.01% level), signaling that our correlation measure is statistically sound. Thus, we conclude that there is a weak but significant correlation between the PTI ratio and the rate of default on all groups, regardless of default measure. Excluding first payment default (Group 2 and Group 4) resulted in lower correlation strength between the PTI and rate of default by these two groups.[4]

[4] The correlation between PTI and default rates is significant but weak. In a prior report, (see Report #3: "Predictive Value of Payment-to-Paycheck Ratio in Payday Lending"). We mapped probability of default by PTI buckets for single payment loans. We saw a linear relationship (clear upward slope) from low PTIs to higher PTIs up to about 35% PTI. As PTIs increased, the percent of loans in a bucket in a default condition increased. This was true even though the raw coefficient of correlation between default and PTI was weak. (See Report #3: "Predictive Value of Payment-to-Paycheck Ratio in Payday Lending"). Here we see stronger statistical correlations, but not the pattern of averages within buckets that appeared in single payment loans. The lack of a pattern may be a function of the fairly high overall percentage of defaults -- these loans appear not to perform well at all. Notably, the Pearson correlation coefficient becomes much weaker once you exclude first payment defaults.

There is correlation, so we continued the analysis by computing the percent of total defaulted loans in each bucket by each definition. Reported in Table 2 below is the percent of total defaulted loans, using each of the four definitions of "default," by PTI bucket in 2.5 percentage point increments. The default percentage as defined in Group 1 to Group 4 is fairly consistent across PTI buckets. What this illustrates is that the definition does not dictate the default rate, which is fairly intuitive. The definition just increases or decreases the absolute number of loans in a group. So even though Group 1, Group 2, Group 3, and Group 4 have similar default percentages in their respective groups, the absolute number in each group will be different.

Table 2

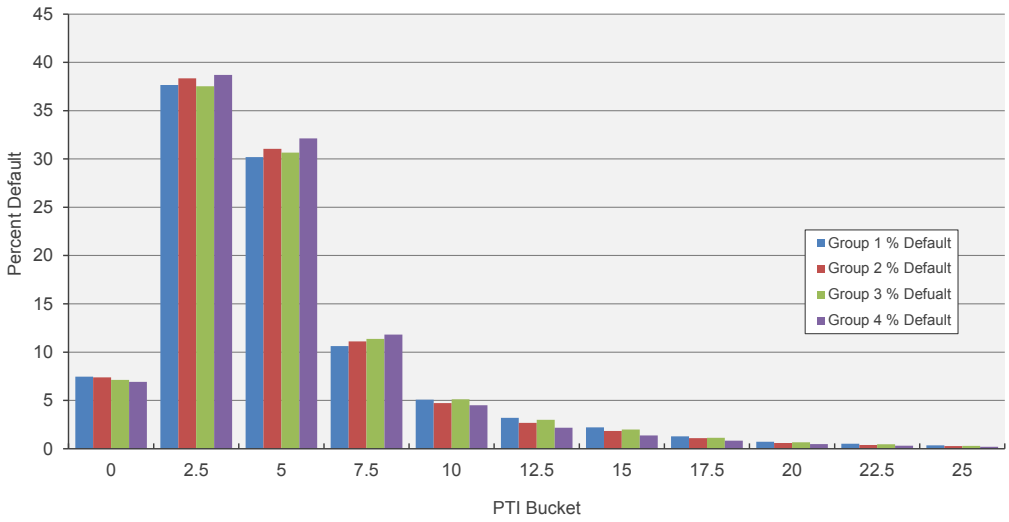
Percent of Defaulted Loans

PTI Bucket	Percent of Defaulted Loans			
	Group 1	Group 2	Group 3	Group 4
0.0	7.46	7.38	7.14	6.92
2.5	37.65	38.35	37.52	38.69
5.0	30.19	31.04	30.66	32.13
7.5	10.62	11.11	11.37	11.82
10.0	5.07	4.73	5.11	4.51
12.5	3.19	2.67	3.00	2.17
15.0	2.22	1.84	1.98	1.38
17.5	1.28	1.09	1.13	0.84
20.0	0.72	0.59	0.66	0.48
22.5	0.52	0.40	0.46	0.32
25.0	0.34	0.28	0.30	0.21

Graphically in Figure 2 below, and as was shown in the Table 2 above, within the buckets the rate of default is stable across definitions. 2.5 percent PTI bucket has the highest percentage of defaults (approximately 35 percent), with the 5.0 percent PTI bucket having the second highest (approximately 30 percent). We did not illustrate all the PTIs, as the sample sizes are very small as the PTI crosses the 25 percent bucket.

Figure 2

Percent of Defaulted Loans in Each Group by PTI Bucket



Returning to the question, does the payment-to-income level have a relationship to the default, as defined in four default groups? If this is so, what is this relationship? In Table 2, we saw the highest default concentrations (as a percentage of total defaults) at the PTI level of 2.5 percent. This is regardless of the definition of default. Additionally we see that across PTI buckets, the definition of default groups is relatively homogeneous by percentage default.

There does appear, however, to be some qualitative difference between first payment defaults and defaults generally. Table 3, below, shows the results from Figure 1 in tabular form.

Table 3

PTI Bucket	Total Loans	Accumulative Loans By Percentage	Group 1 Defaults	Group 2 Defaults	Group 3 Defaults	Group 4 Defaults
0*	35,756	8.87%	26.4%	16.1%	33.9%	19.7%
2.5	163,598	49.47%	29.2%	18.2%	39.0%	24.0%
5	114,989	78.01%	33.3%	21.0%	45.3%	28.4%
7.5	40,830	88.15%	32.9%	21.2%	47.3%	29.4%
10	18,521	92.74%	34.7%	19.9%	46.9%	24.8%
12.5	11,000	95.47%	36.8%	18.9%	46.3%	20.1%
15	7,252	97.27%	38.7%	19.7%	46.5%	19.4%
17.5	4,107	98.29%	39.4%	20.6%	46.9%	20.7%
20	2,318	98.87%	39.3%	20.0%	48.4%	20.9%
22.5	1,549	99.25%	42.6%	19.9%	50.6%	21.0%
25	989	99.50%	44.1%	22.2%	51.7%	21.7%
27.5	647	99.66%	43.6%	18.1%	52.1%	19.9%
30	371	99.75%	41.8%	17.0%	49.6%	22.9%

Recall that Groups 2 and 4 represent default rates, excluding first payment defaults. Groups 1 and 3 represent all defaults. Note first that overall default rates are 10% to 20% higher when including first payment defaults. Second, note that the difference between total default rates and non-first-payment default rates (i.e., the first payment default rate) increases as the PTI bucket value increases. The increase is not linear (which is reflected in the weak statistical correlation), but it is an obvious trend. In contrast, non-first-payment defaults are relatively flat. This may suggest that the underwriting information provided by first payment defaulters may be less reliable for underwriting than the information provided by those who made several payments but ultimately failed. However, it may also suggest that the predictive quality of underwriting generally is limited, and that lack of quality manifests itself most markedly in first payment defaults.

Concluding Comments

In our data set, the default rate does not increase markedly as PTI increases and there is no linear relationship between PTI and default. Therefore using 2.5% PTI (or 5.0% PTP) as a safe harbor, may in fact cause greater default rates than using none at all. The higher PTI buckets in our study (although much smaller samples) had lower default rates. This answers the first question: there is not a significant relationship between the PTI ratio and the default rate in our analysis.

A secondary item we wanted to analyze was whether the first payment default portion of online installment loans are indicators of fraud and may be qualitatively different from other defaulted loans. We find higher default rates when including first payment defaults, and we find the rates to increase somewhat as PTI increases (at least compared to non-first-payment defaults). The significant (and increasing) difference between total defaults and non-first-payment defaults raises questions as to the quality of information included and processed in underwriting (whether due to submission of inaccurate information or incomplete processing of information).

We note that our various screens for data quality (e.g., consistency of payment reporting) may have introduced sampling bias in the lenders selected for this analysis. The overall default rate (near 40 percent) is certainly higher than what we observed in other payday loan samples[5]. Other samples of installment loans may produce different results. We have learned in our previous research is that there is correlation between default and some measure of payment to income ratio in storefront payday lending. See Report #3: "Predictive Value of Payment-to-Paycheck Ratio in Payday Lending" which uses the PTI ratio for payday lending to see if this measure has any predictive value for the default rate. In all of our research the correlation is significantly different than zero, but the correlation coefficient strength is not high.

[5] Recall that we *excluded lenders* with a lender-reported default rate in excess of 40% in selecting this sample. See Report #3: "Predictive Value of Payment-to-Paycheck Ratio in Payday Lending"

nonPRIME101

nonPrime101.com provides research studies and articles about non-prime consumer behavior to help the public and researchers better understand them. The rate of non-prime consumers, which include thin-file, no-file and prior prime consumers, continues to rapidly grow and nonPrime101.com provides unbiased and empirical studies that show the credit usage behaviors, activities and needs of non-prime consumers as a whole.

CLARITY SERVICES INC.

Clarity Services, Inc. provides powerful real-time fraud detection and credit risk management solutions for Middle America. By leveraging unique data assets and scores, Clarity Services' suite of FCRA regulated reports and scores empower providers with visibility into critical consumer information not available on traditional bureau reports. For more information, visit clarityservices.com.

The CFPB Five Percent Solution:

Analysis of the Relationship of Payment-to-Income Ratio to Defaults in Online Installment Loans

NPRP-5.1.0.091015