

Analysis using excel course

LOANS ANALYSIS

BMC BANK

DATA SCIENCE INTAKE 43 - ITI



A Trustworthy Bank



OBJECTIVES

We reach this by investigating:

- Loan characteristics
- Borrower's characteristics



Marketing
Campaign

Reduce Risk
of loan
default

A background image showing a wooden desk with various financial documents. One document features a 'Loan Calculator' with a bar chart. Another document shows a pie chart. A hand is visible holding a calculator. The right side of the image is a solid teal color with decorative elements: a brown circle and a series of concentric brown arcs.

PRESENTATION OUTLINE

Analysis Scope

Analysis Base

Inclusion and Exclusion Criteria

Time Frame

Data Included

Analysis and Insights

Recommendations

ANALYSIS SCOPE



Analysis base

The BMC bank loan data, which has the info about the loans fully paid or defaulted.



Inclusion Criteria

Bank loans that ended up either charged off (defaulted) or fully-paid.



Exclusion criteria

Loans that are currently being held is excluded from the analysis.



ANALYSIS SCOPE



Time Frame

The loans were issued along the 12 months of year 2018.



Data Included

information on loan amounts, interest rates, loan terms, purposes and status.

Demographic information about borrowers like income, employment length, home state and Debt-to-Income (DTI).





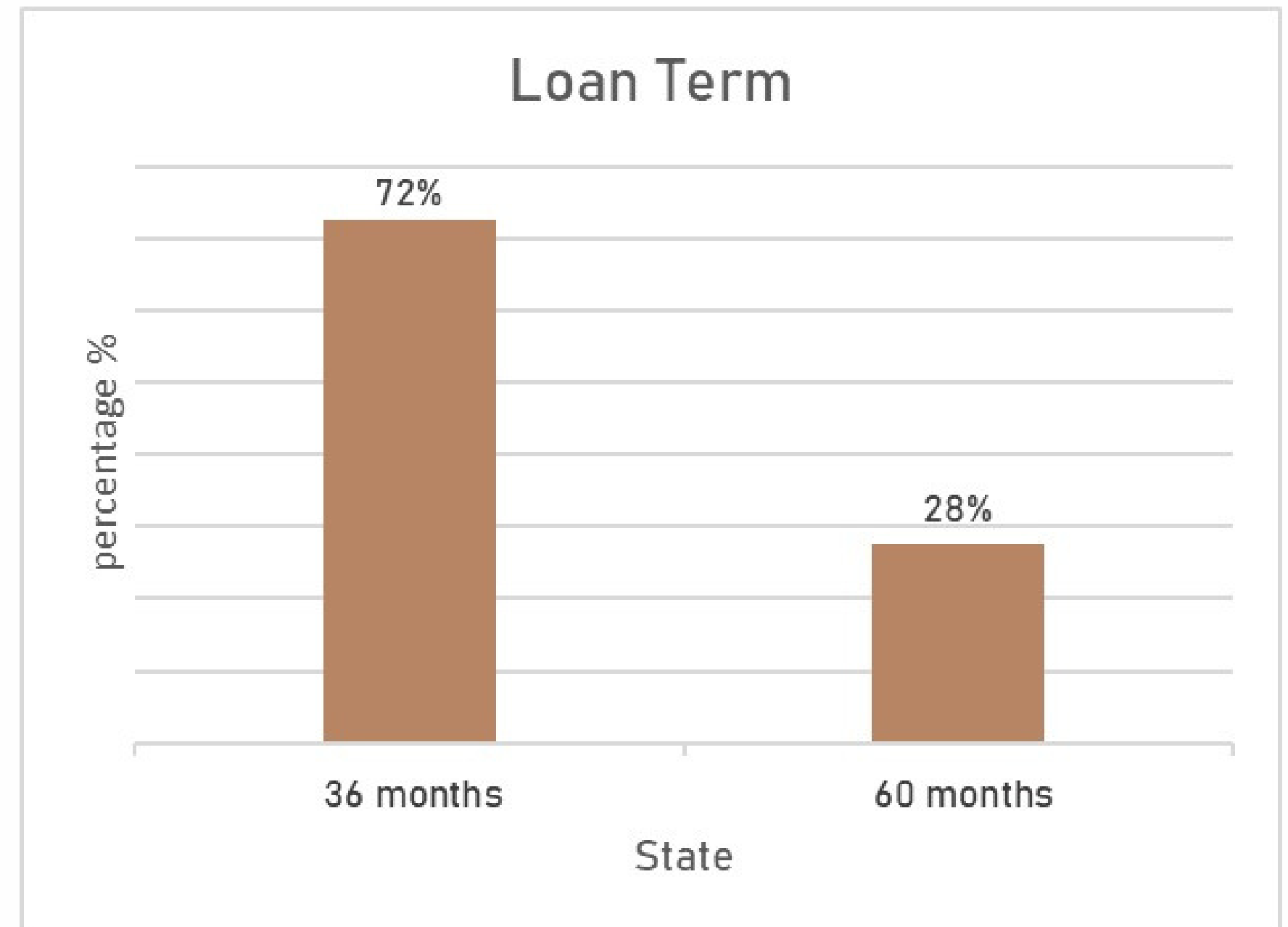
ANALYSIS AND INSIGHTS

LOAN TERM VS LOAN STATUS

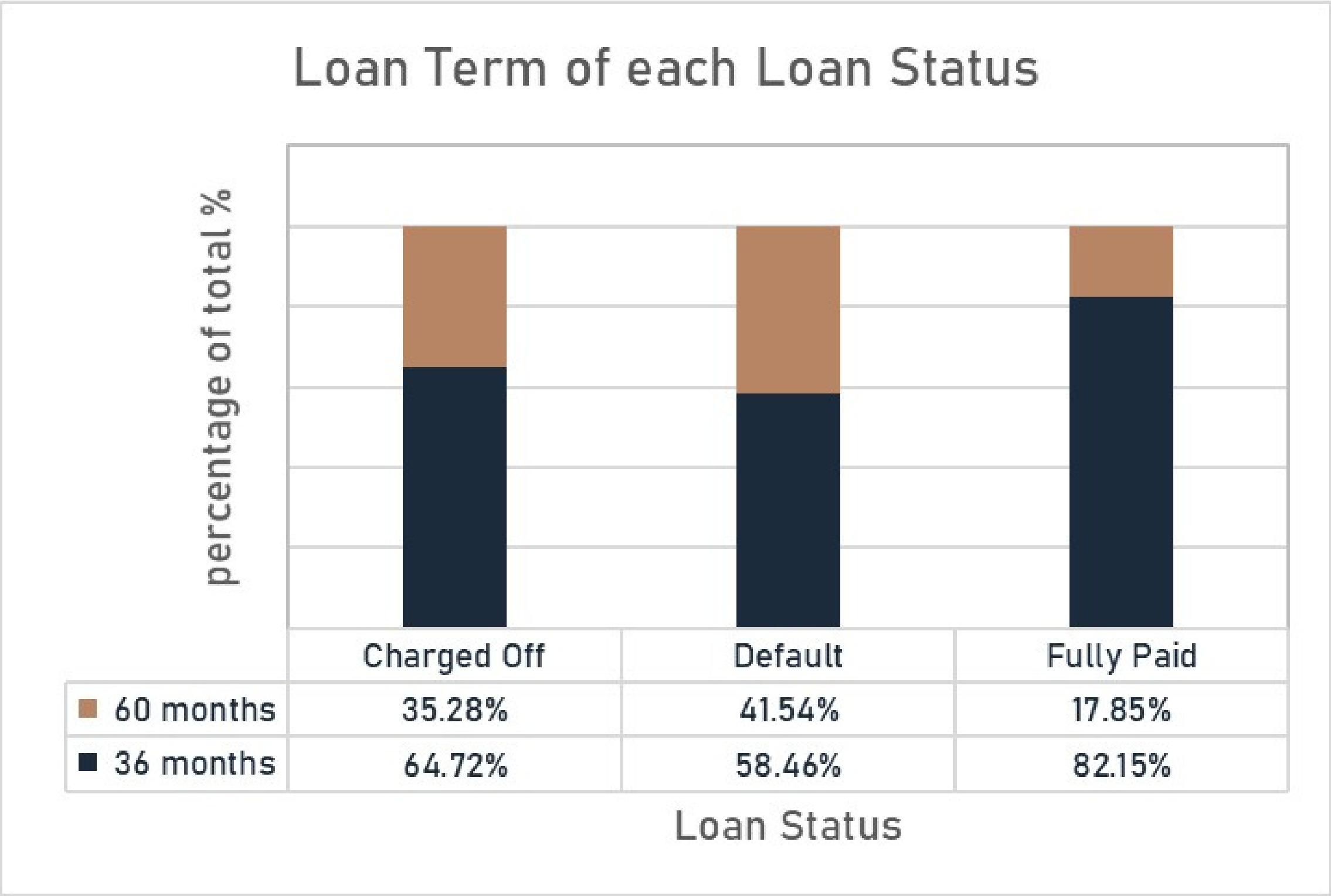
Which loan term decreases the risk of loan default?

When checking the loan term column, it appears that the number of loans with the term 36 months is way more than those with the 60 month term.

This in our mind, let's check whether the term has an influence on the loan status



Which loan term decreases the risk of loan default?



We can say that Clients who are offered loans with a higher loan term are more likely to default on their loans.

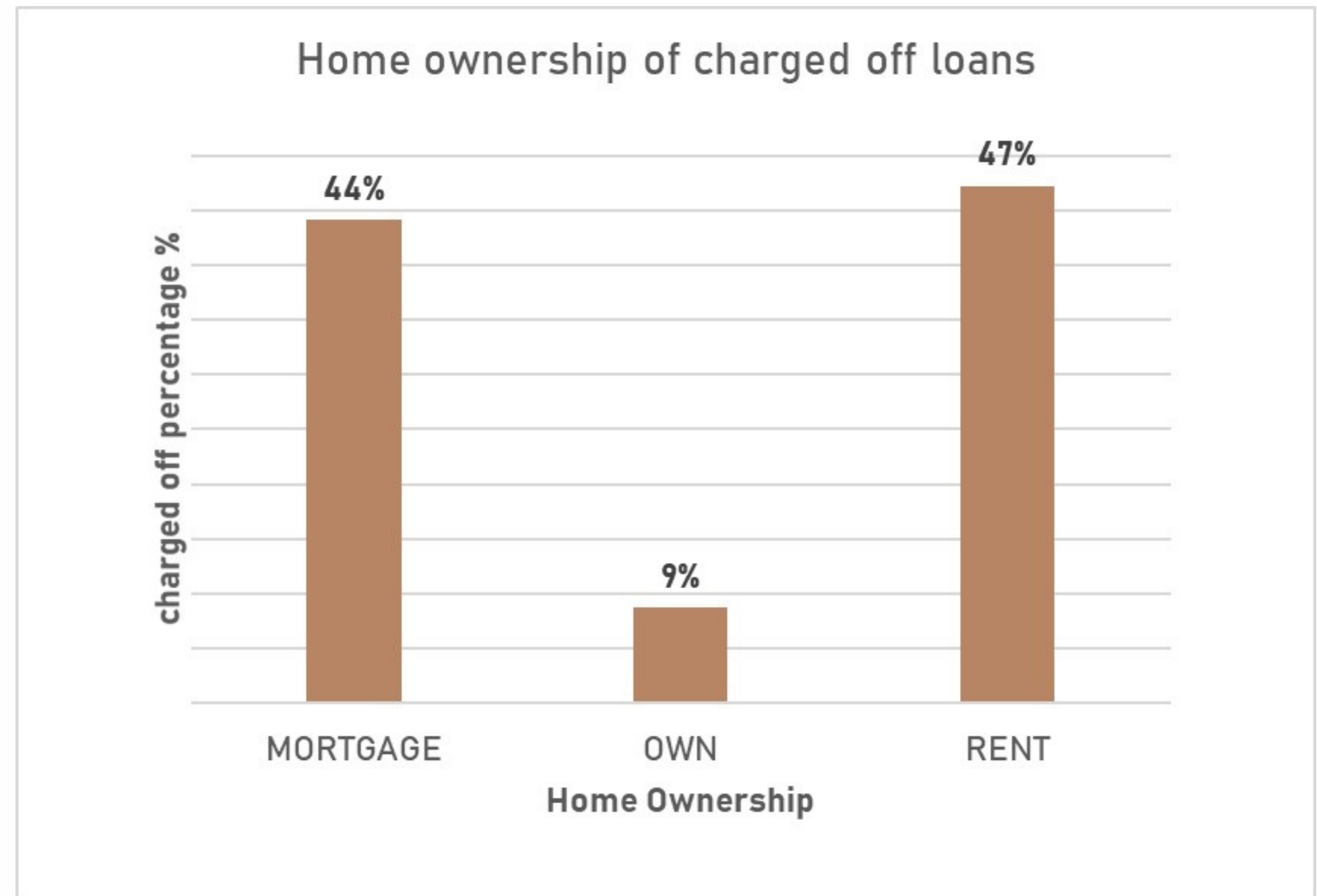


The bank should consider offering loans with smaller loan terms to reduce the risk of default.

HOME OWNERSHIP

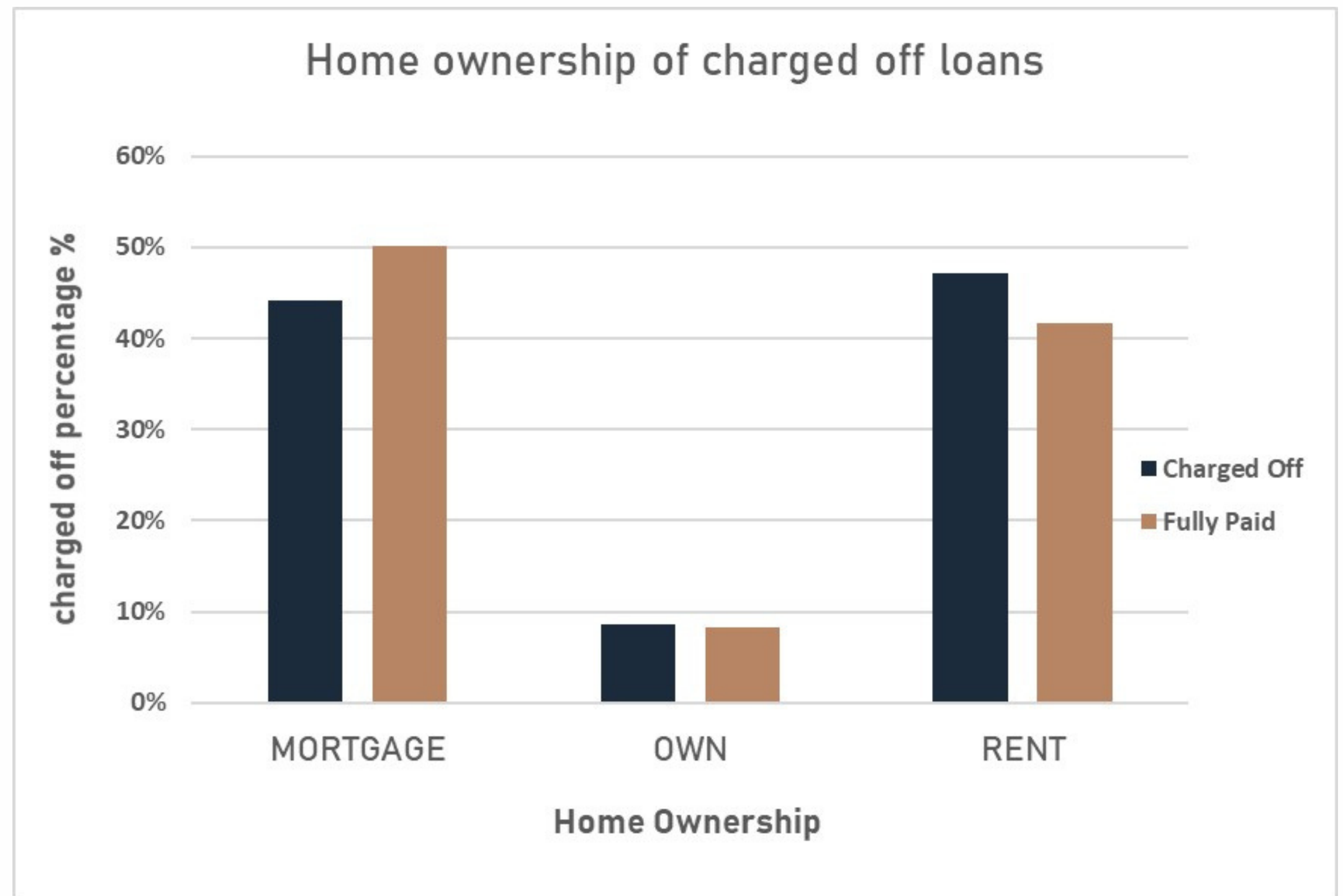
Does Home ownership indicate an eligible customer segment?

Inspecting home ownership's effect on loan status, it appears for a while that rent or mortgage in home ownership indicates a big risk or high probability of default.



Does Home ownership indicate an eligible customer segment?

But, further analysis showed that home ownership doesn't have a significant effect on loan status as for fully paid loans mortgage and rent also appears to have the biggest shares





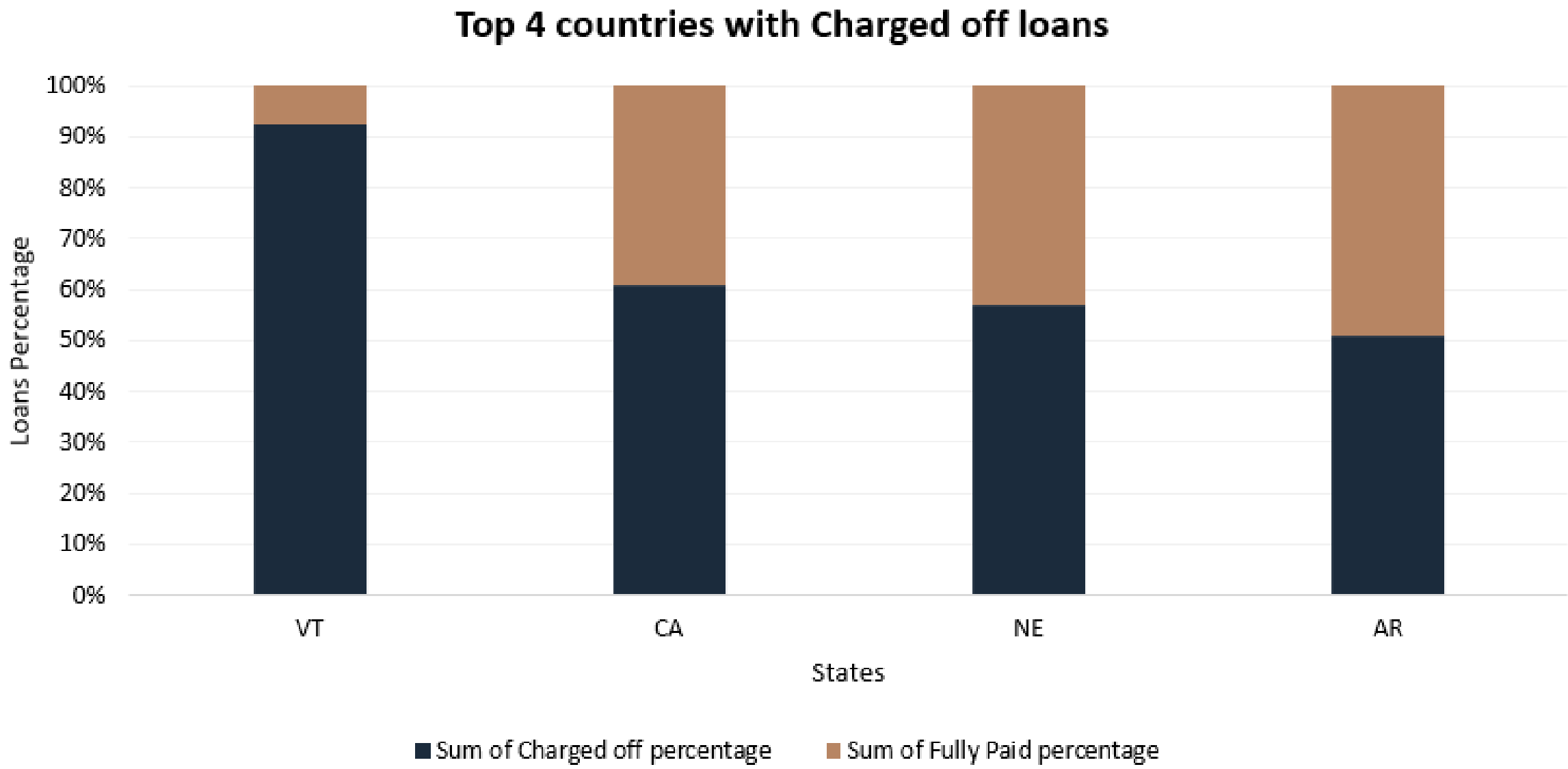
Home ownership is not an indicator for loan default, so bank can use the campaign for all people whether they have a home or not without increasing the risk of default.

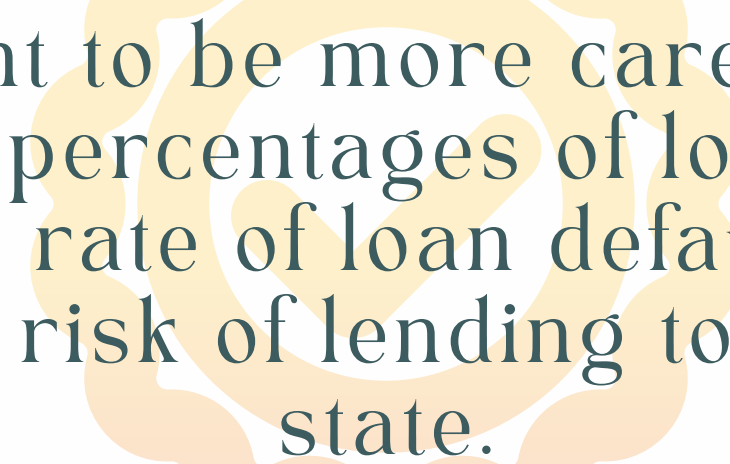
ADDRESS STATE

Should the bank avoid specific states where the risk is max?

VT	Vermont
CA	California
NE	Nebraska
AR	Arkansas

The 4 countries that have the highest rate of Charged off loans are Vermont, California, Nebraska and Arkansas.





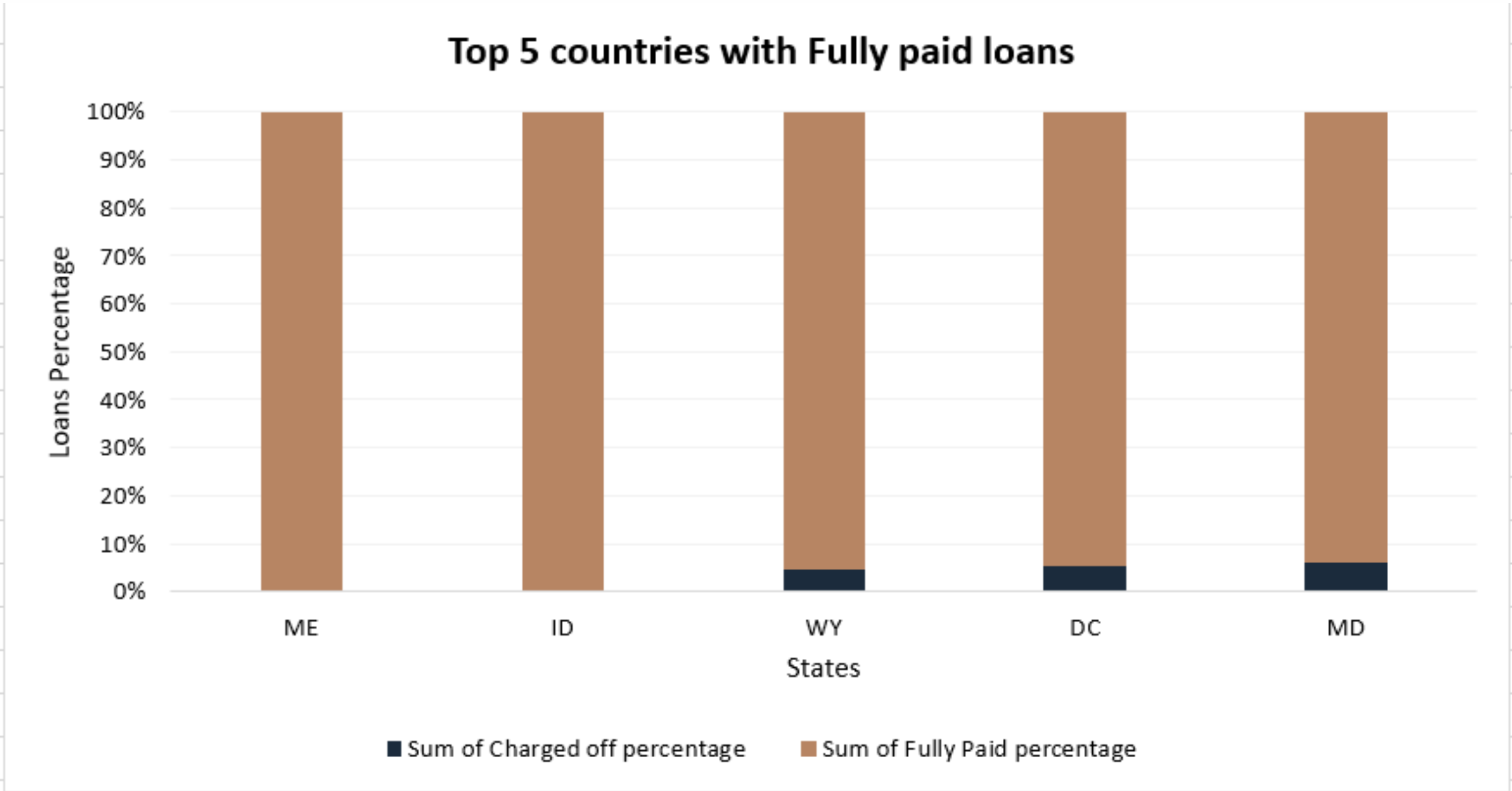
The bank may want to be more careful with loans from states with higher percentages of loan defaults . This is because a higher rate of loan defaults in a state may indicate a higher risk of lending to customers in that state.

ADDRESS STATE

Should the bank target specific states where the risk is min?

ME	Maine
ID	Idaho
WY	Wyoming
DC	District of Columbia
MD	Maryland

The 5 countries that have the highest percentage of fully paid loans are Maine, Idaho, WYoming, District of Columbia and Maryland.



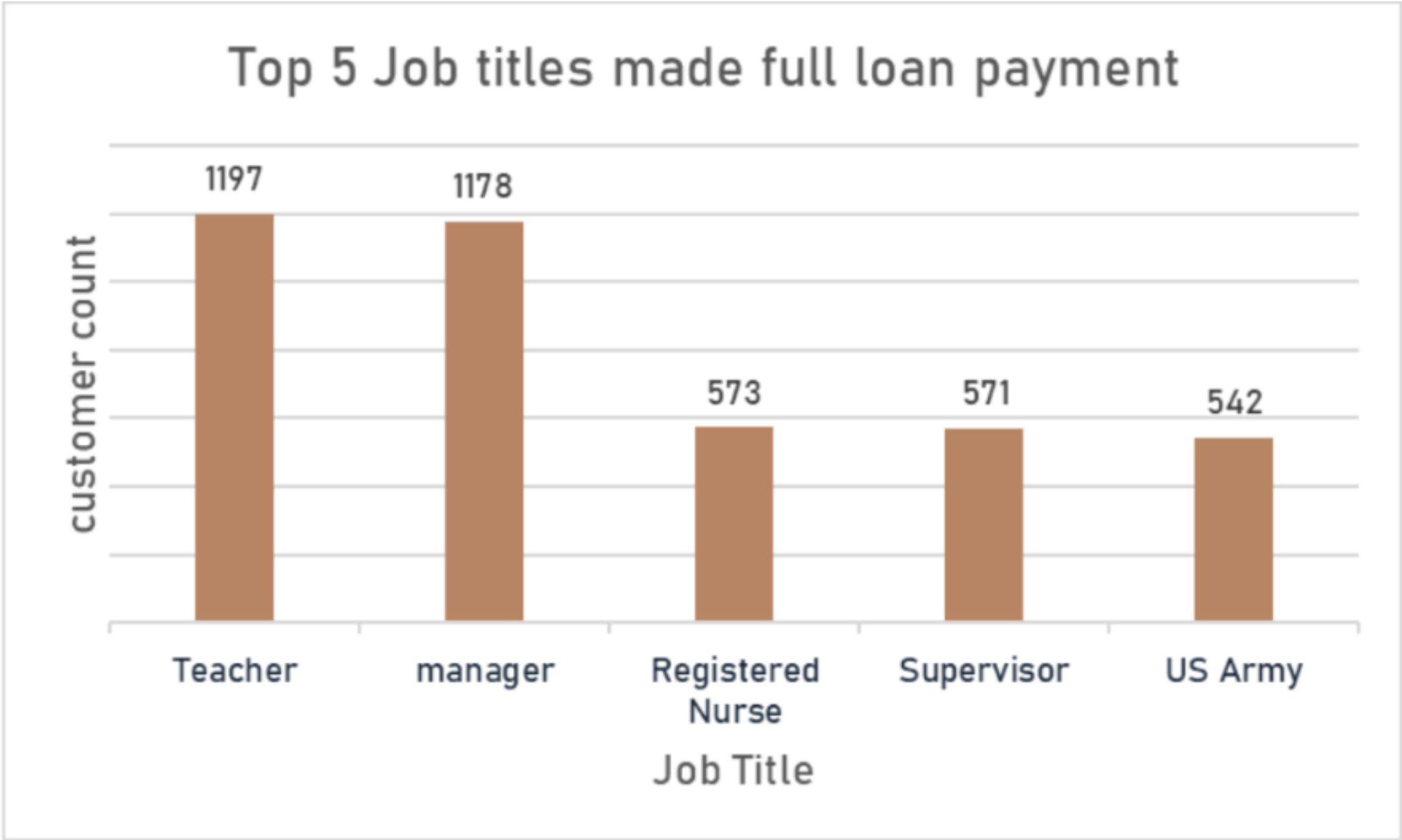
The bank may want to consider targeting states with a higher percentage of fully paid loans in its marketing campaign.

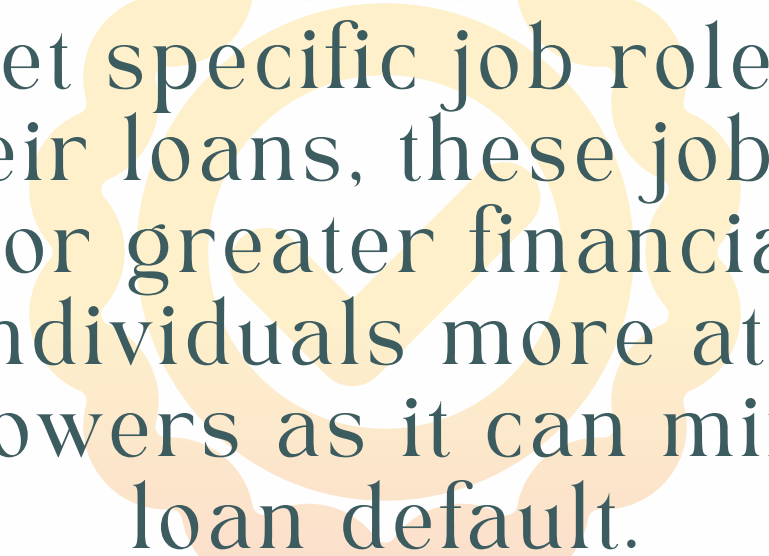
This is because these states may indicate a more financially stable customer base with a lower risk of loan default. By targeting these states, the bank can increase its chances of attracting more creditworthy customers and reducing the risk of loan defaults.

TITLES AND JOB ROLES

Should the bank target specific titles which can afford a loan?

The top 5 titles with the highest number of full payed loans are teachers, mangers, registered nurses, supervisors and US Army.

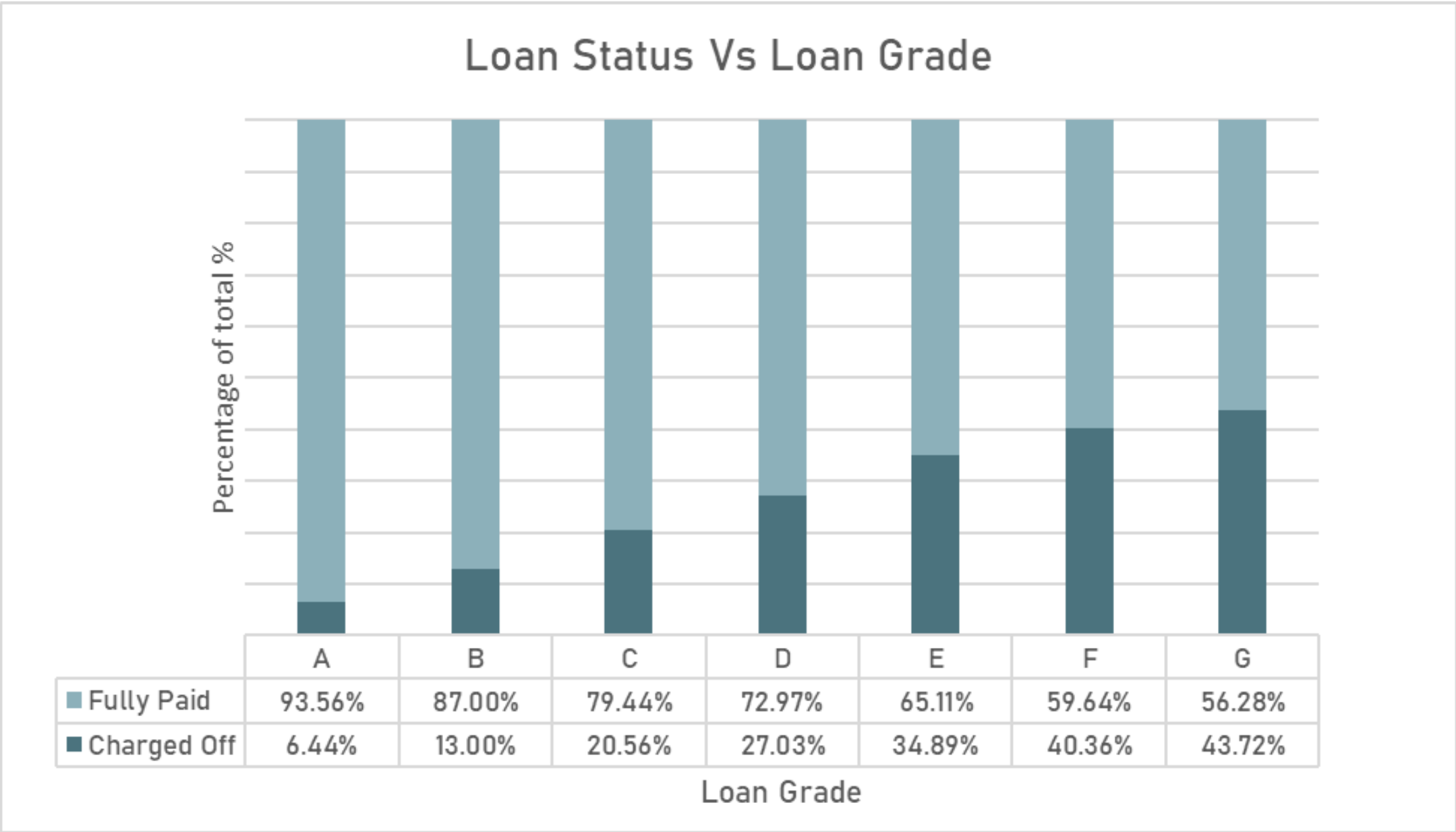




The bank may target specific job roles that proved to be able to fully pay their loans, these job roles may indicate a higher income or greater financial stability, which could make these individuals more attractive to the bank as potential borrowers as it can minimize the risk of loan default.

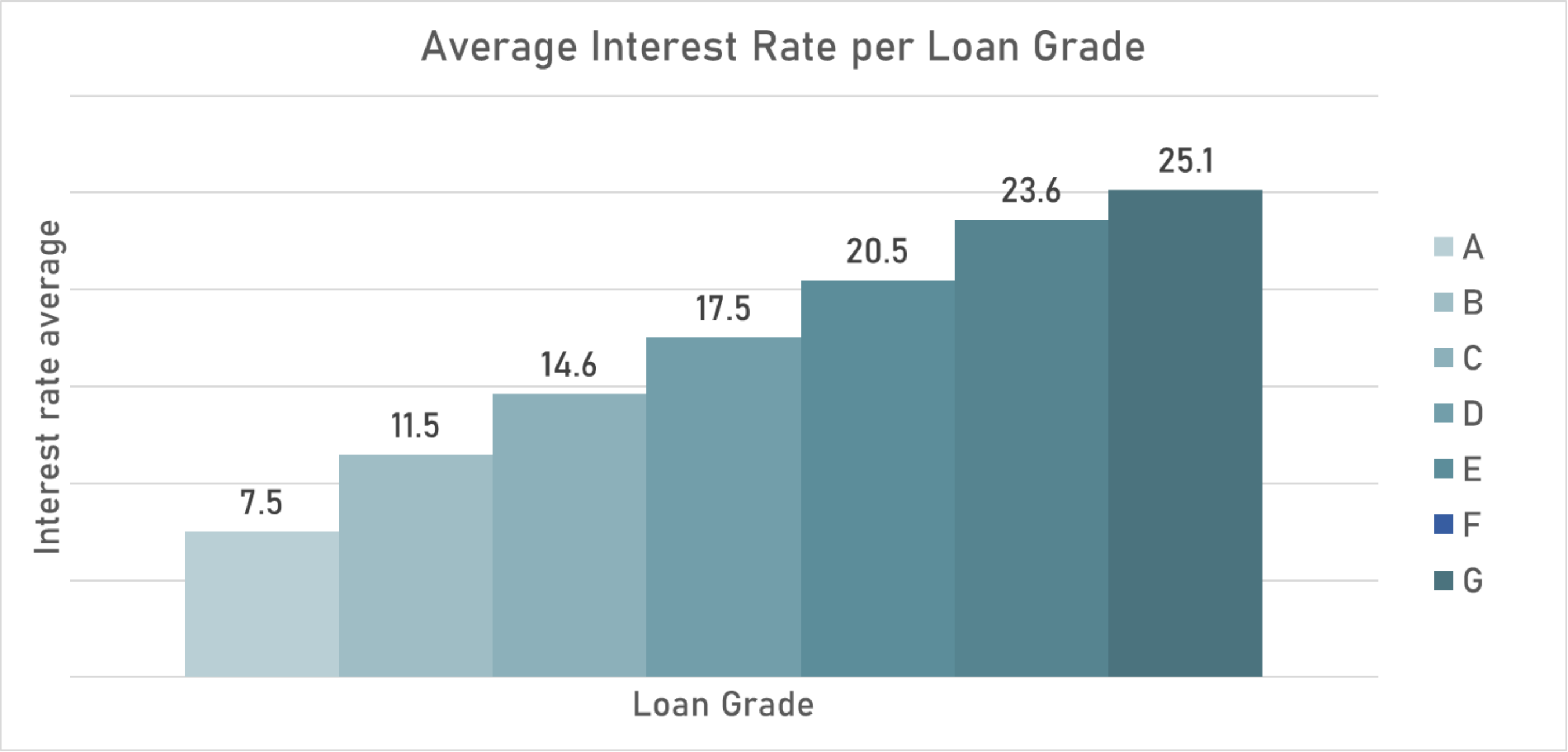
LOAN GRAGES

Loan grading is the process of assigning a quality score to a loan application to identify a risk of default. This score is based on the borrower’s credit history and stability of the income.



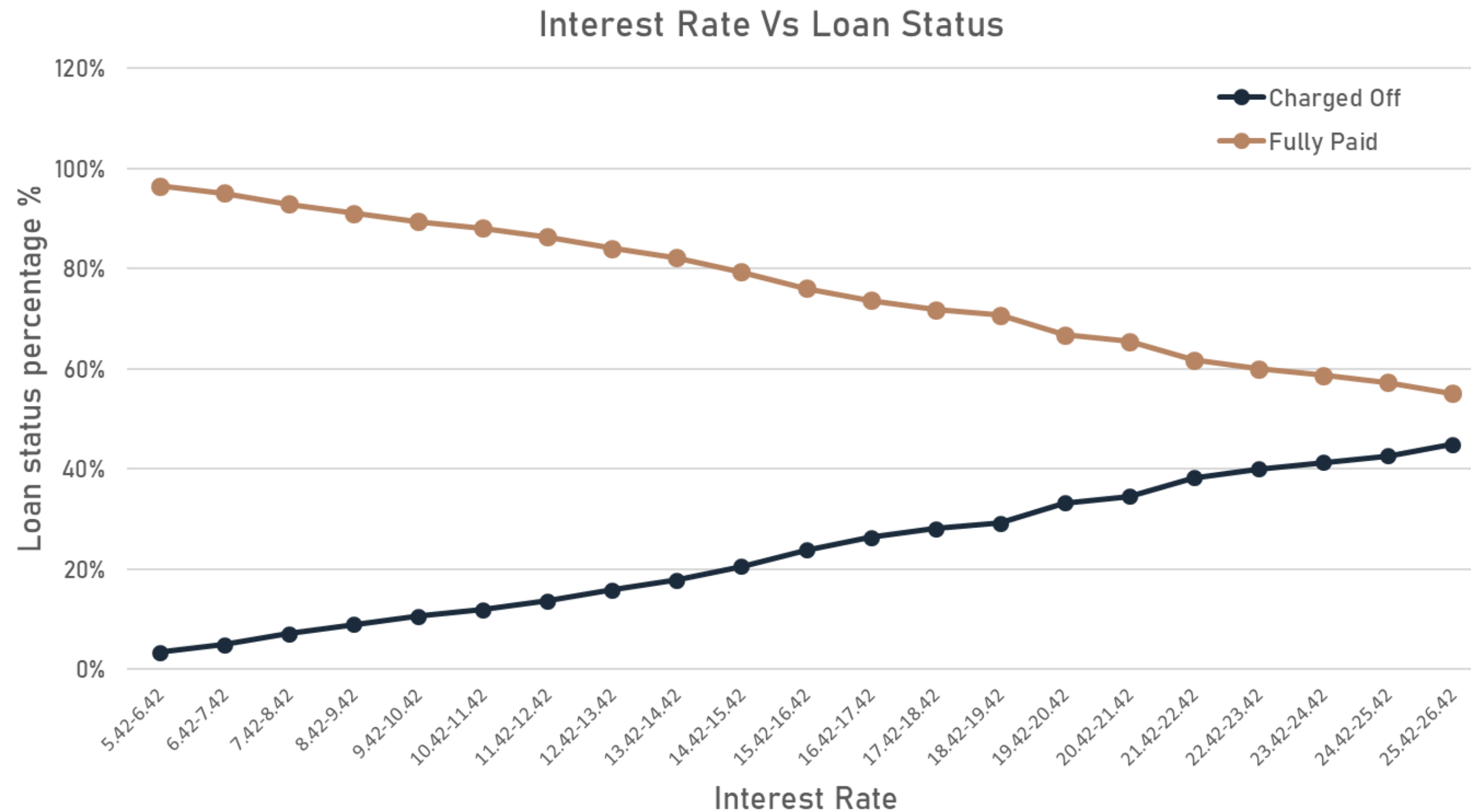
LOAN GRAGES

Relation between loan grade & the interest rate.



INTEREST RATE

Does higher interest rate corresponds to more risk?

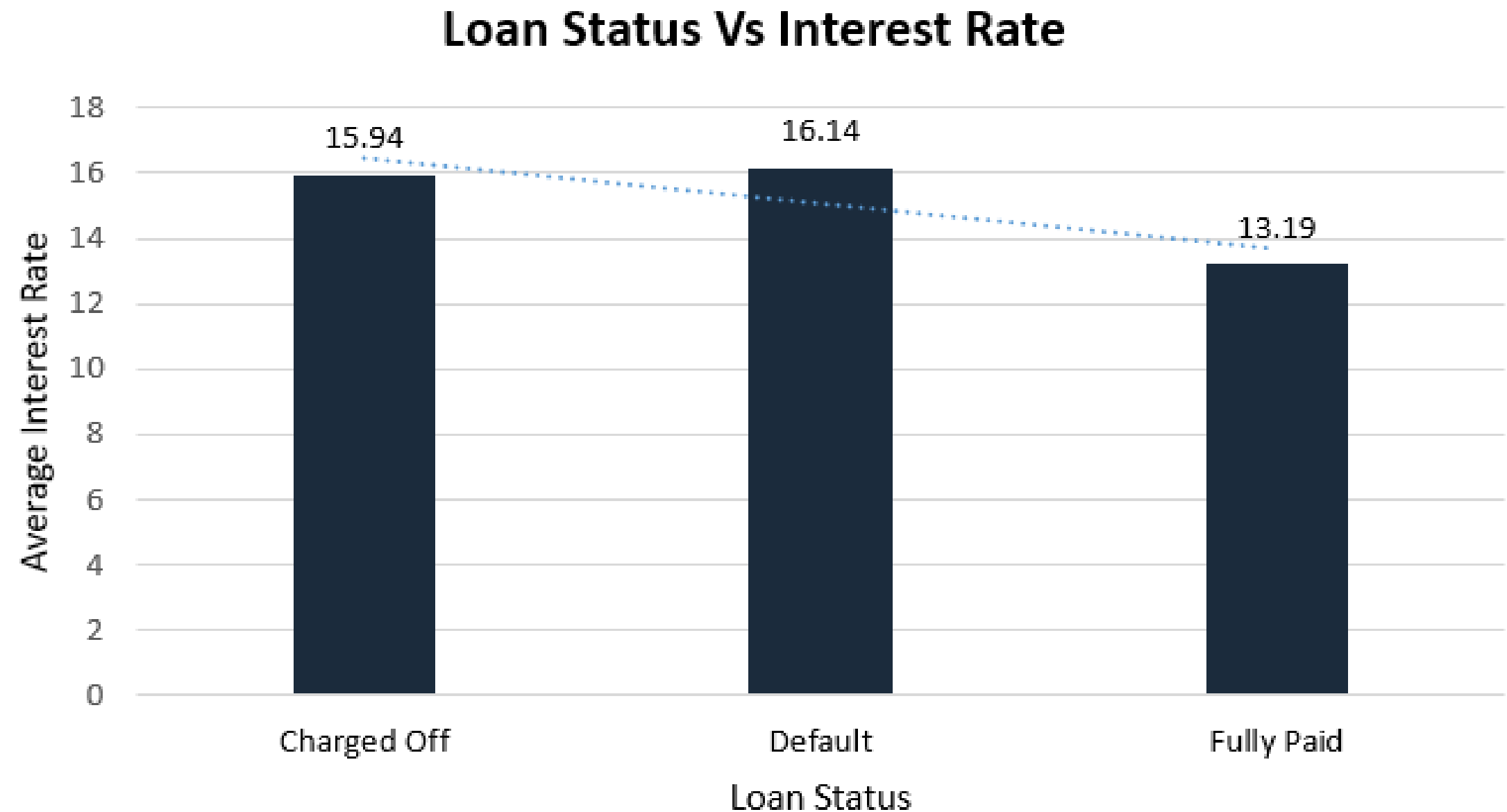


Clients who are offered loans at a higher interest rate are more likely to default on their loans.

INTEREST RATE

Does higher interest rate corresponds to more risk?

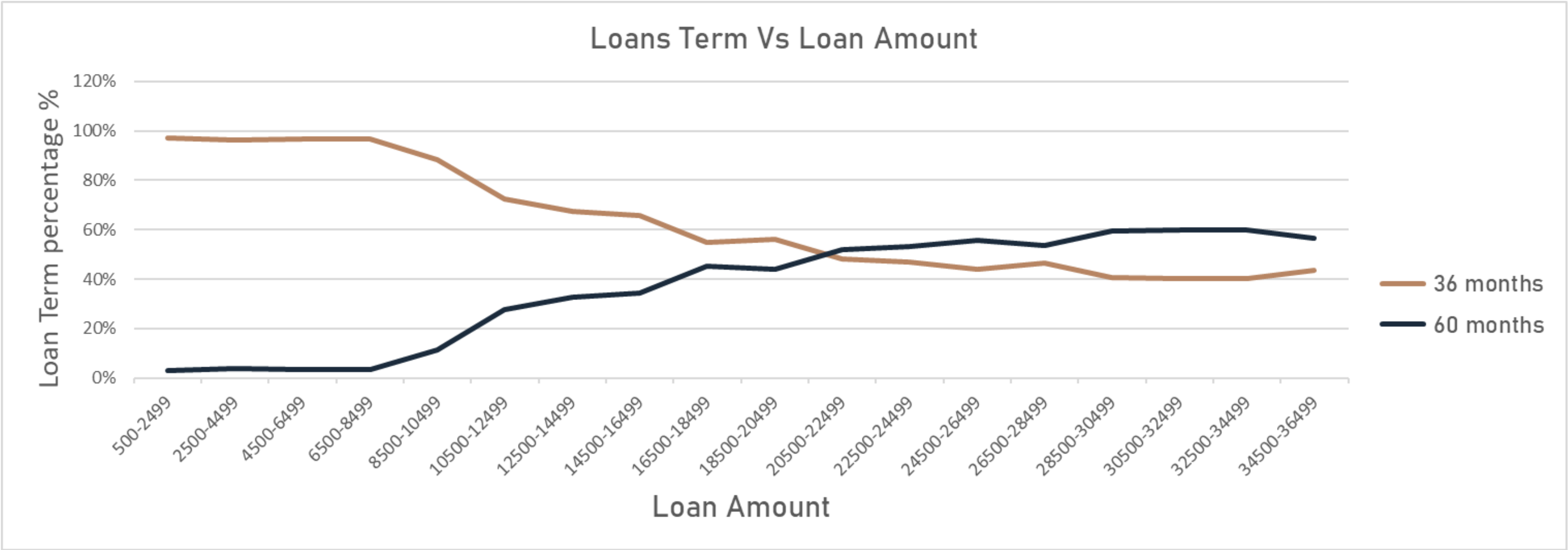
Inspecting the interest rate for the fully paid and default or charged off loans, it appears that fully paid loans have on average smaller interest rates compared to defaulted loans.





The bank should consider offering loans at the marketing campaign at a reasonable interest rate to reduce the risk of default.

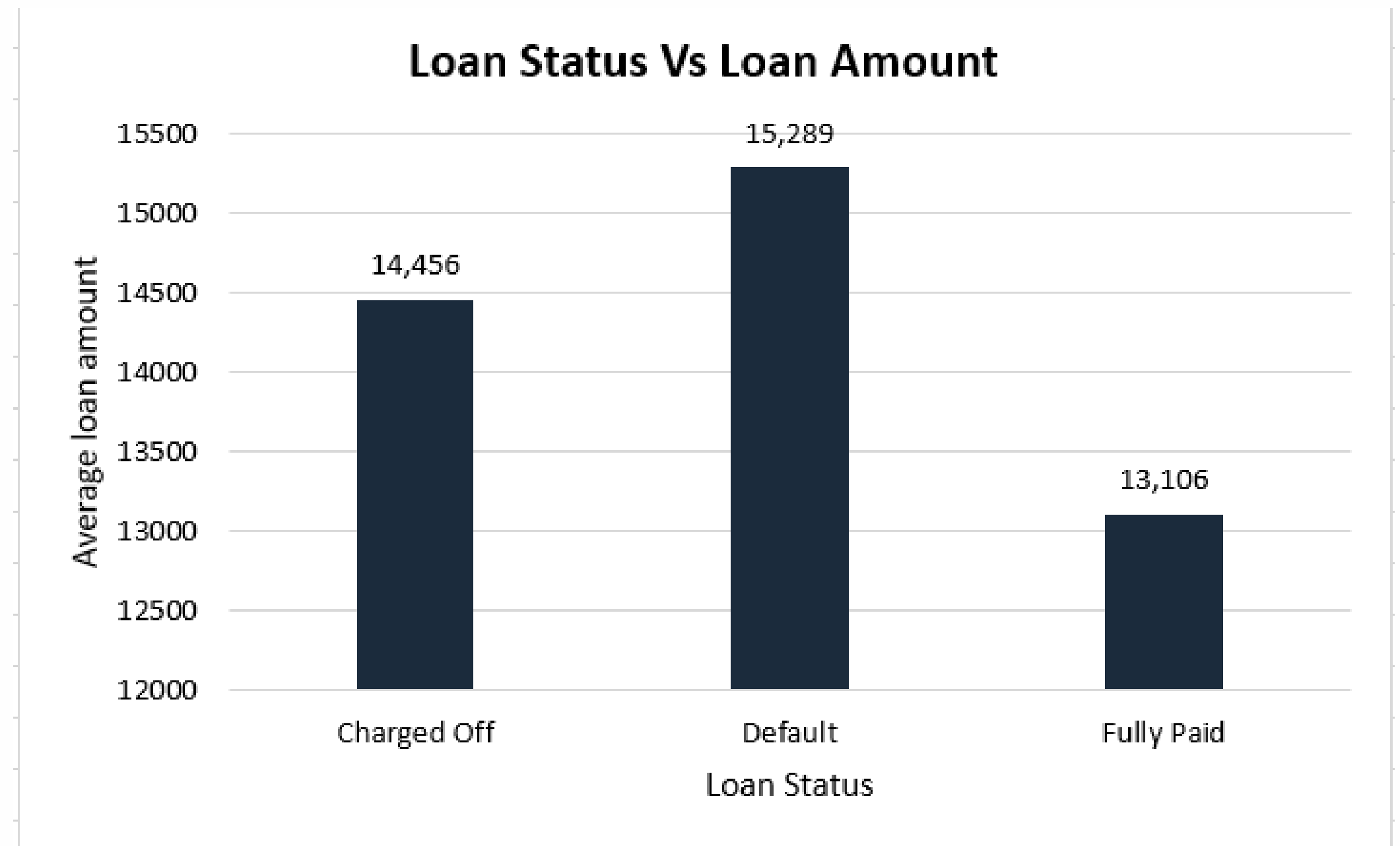
LOAN AMOUNT

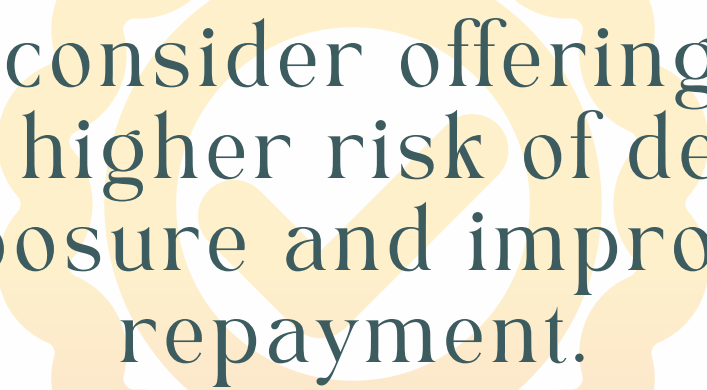


LOAN AMOUNT

Does higher loan amount corresponds to higher risk of default?

By investigating the loan amount with the loan status we find that the defaulted loans have on average higher loan amounts than the fully paid loans.





The bank should consider offering smaller loans to clients who have a higher risk of default. This reduces the bank's risk exposure and improves the chances of repayment.

NUMBERS RANGES

Loan amount range	Number
500-3374	1
3375-6249	2
6250-9124	3
9125-11999	4
12000-14574	5
14875-17749	6
17750-20624	7
20625-23499	8
23500-26374	9
26375-29249	10
29250-32124	11
32125-35000	12

Loan interest rate range	Number
5.42-7.13	1
7.14-8.85	2
8.86-10.57	3
10.58-12.2	4
12.3-14.01	5
14.02-15.73	6
15.74-17.45	7
17.46-19.17	8
19.18-20.8	9
20.9-22.61	10
22.62-24.33	11
24.34-26.07	12

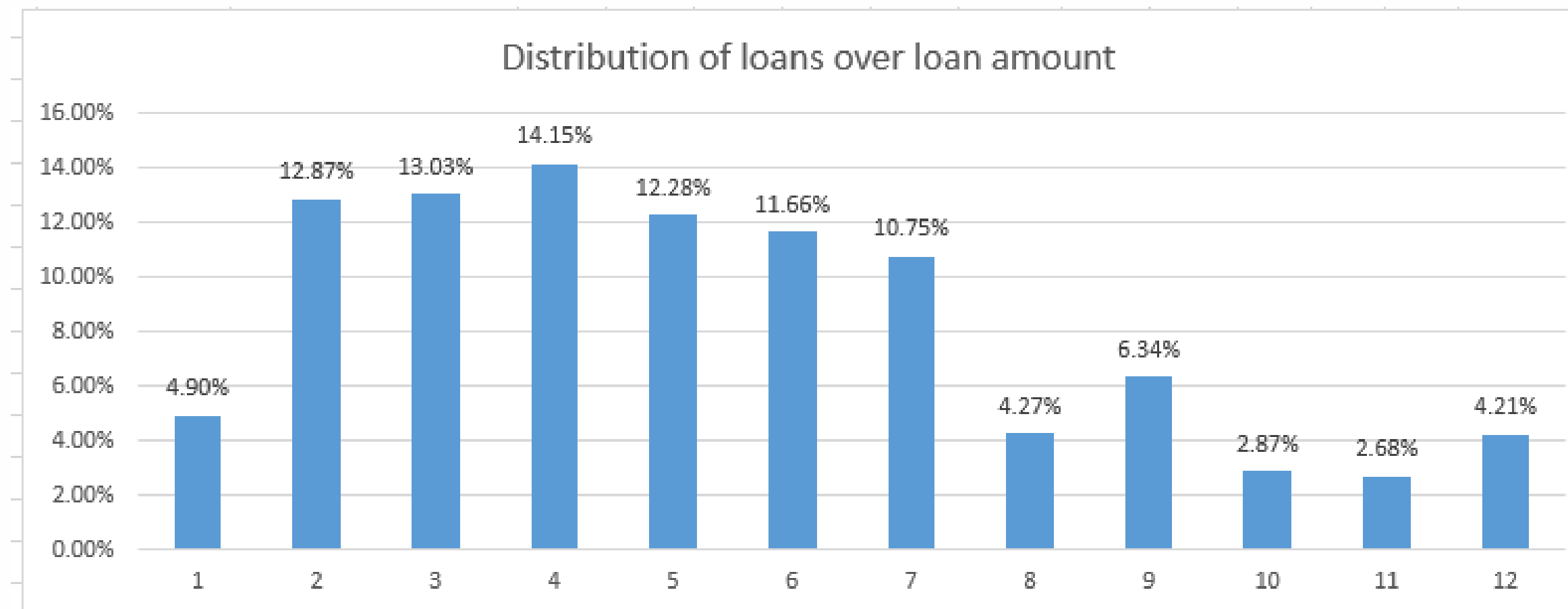
A DEEPER LOOK AT THE LOAN TERM

Is the charged off and default loans percentage affected by loan amount in each loan term ?

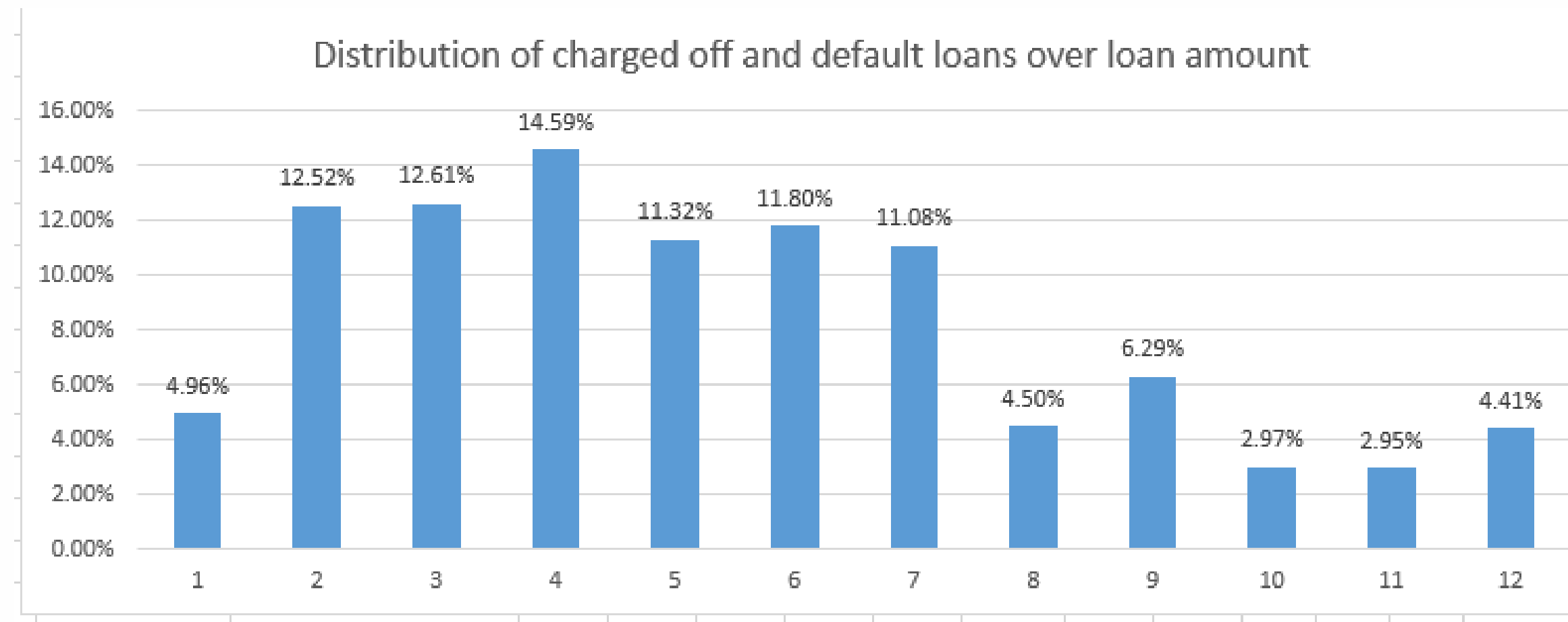
LOAN TERM VS LOAN AMOUNT

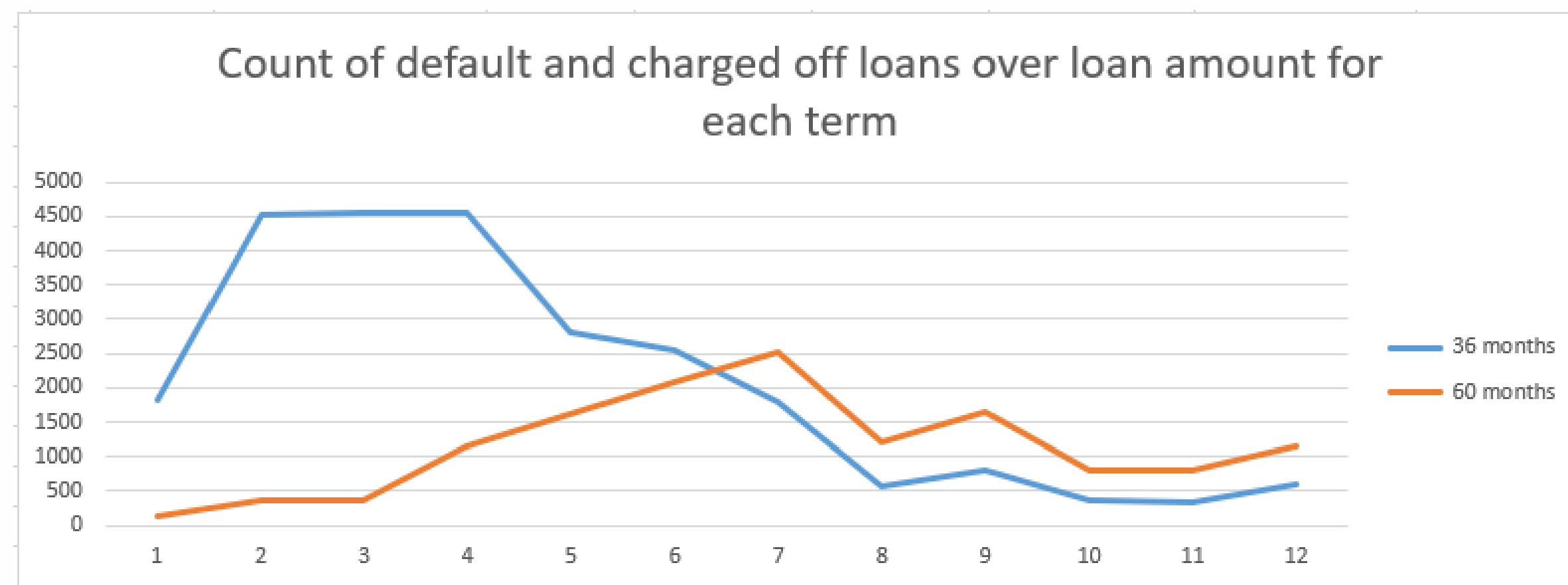
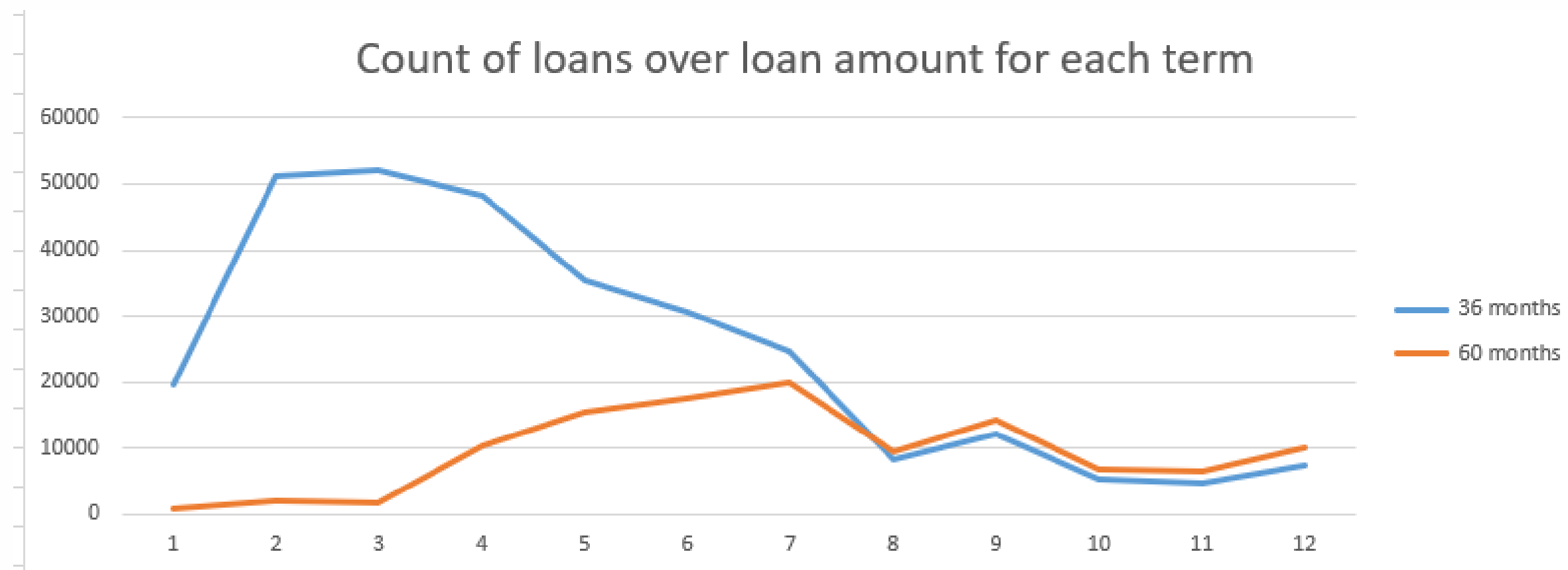
It is expected that the bigger the loan term, the safer it is, specially for large loan amounts.

Lets find out.

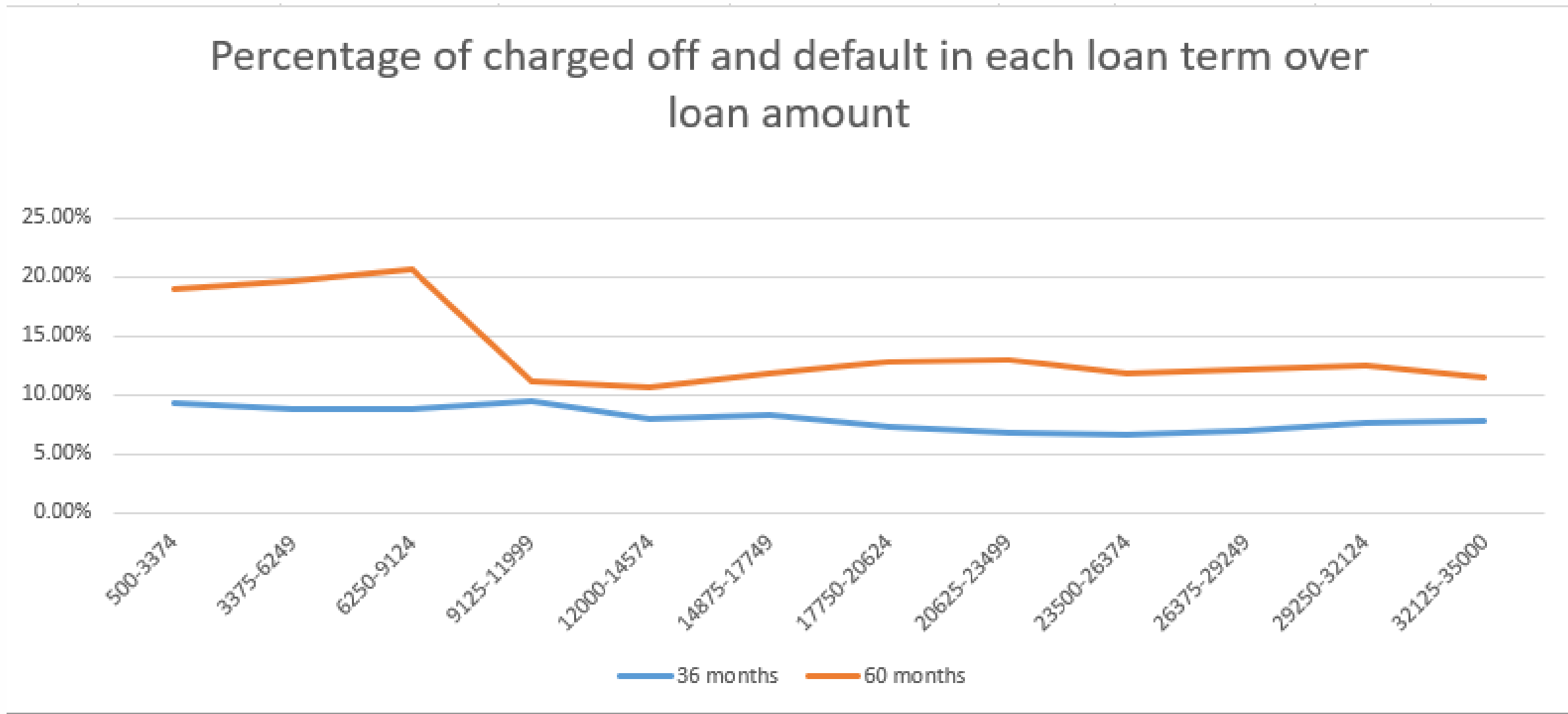


Here we see the distribution of charged off and default loans vs loan amounts





Looks like having a charged off or default loan in different loan terms is independent of loan amount





60-months loan term is not considered safer even in larger loan amounts in fact, It has higher default and charged off percentages across all different amount ranges

A DEEPER LOOK AT THE COMBINATION OF INTEREST RATE AND LOAN AMOUNT

It is expected that the larger the loan amount and the higher the interest rate is, the more likely this loan will default or get charged off.

The goal is to find a certain interest rate value that loans tend to default and get charged off exceeding it in each loan purpose

NUMBERS RANGES

Loan amount range	Number
500-3374	1
3375-6249	2
6250-9124	3
9125-11999	4
12000-14574	5
14875-17749	6
17750-20624	7
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Loan interest rate range	Number
5.42-7.13	1
7.14-8.85	2
8.86-10.57	3
10.58-12.2	4
12.3-14.01	5
14.02-15.73	6
15.74-17.45	7
17.46-19.17	8
19.18-20.8	9
20.9-22.61	10
22.62-24.33	11
24.34-26.07	12

Lets look at the top 4 loan purposes in charge off and default percentages

Loans with home improvement purpose

Count of loans vs loan amount and interest rate

Row Labels		1	2	3	4	5	6	7	8	9	10	11	12
1		118	152	155	244	299	254	141	103	57	18	27	10
2		425	416	433	637	703	544	278	231	109	59	40	21
3		343	314	334	467	509	465	252	204	72	38	16	14
4		307	272	376	477	541	497	273	262	95	58	32	27
5		246	181	278	324	391	361	216	189	89	62	42	38
6		215	210	267	311	374	388	241	201	101	75	36	46
7		159	167	239	312	347	301	247	181	120	90	56	56
8		75	64	66	78	100	89	93	78	46	44	27	24
9		111	151	128	177	188	188	139	119	92	81	46	23
10		36	79	39	67	63	76	70	71	38	40	21	27
11		15	33	65	61	92	101	68	93	63	47	29	30
12		1	50	61	128	157	170	155	191	109	113	65	51

Count of default and charged off loans vs loan amount and interest rate

Row Labels		1	2	3	4	5	6	7	8	9	10	11	12
1		2	9	12	16	21	31	17	11	4	3	1	2
2		5	17	18	43	68	48	37	24	9	1	6	2
3		9	10	15	39	44	52	38	23	9	6	2	2
4		2	12	23	36	40	44	37	25	3	13	3	4
5		1	3	19	18	26	29	23	30	12	11	4	3
6		5	7	14	27	20	32	29	34	8	8	3	6
7		1	9	8	29	21	23	33	22	15	14	13	8
8		4		2	6	10	9	14	13	5	3	2	2
9		3	3	8	16	18	19	18	23	14	21	11	5
10			3	1	7	5	8	5	10	4	9	6	6
11				3	4	3	7	10	12	10	12	2	8
12			2	3	4	8	18	16	26	12	26	10	12

Here we can see the charged off and default percentages distribution

	1	2	3	4	5	6	7	8	9	10	11	12
1	1.695	5.92	7.74	6.56	7.02	12.2	12.1	10.7	7	17	3.7	20
2	1.176	4.09	4.16	6.75	9.67	8.82	13.3	10.4	8.3	1.7	15	9.5
3	2.624	3.18	4.49	8.35	8.64	11.2	15.1	11.3	13	16	13	14
4	0.651	4.41	6.12	7.55	7.39	8.85	13.6	9.54	3.2	22	9.4	15
5	0.407	1.66	6.83	5.56	6.65	8.03	10.6	15.9	13	18	9.5	7.9
6	2.326	3.33	5.24	8.68	5.35	8.25	12	16.9	7.9	11	8.3	13
7	0.629	5.39	3.35	9.29	6.05	7.64	13.4	12.2	13	16	23	14
8	5.333	0	3.03	7.69	10	10.1	15.1	16.7	11	6.8	7.4	8.3
9	2.703	1.99	6.25	9.04	9.57	10.1	12.9	19.3	15	26	24	22
10	0.000	3.8	2.56	10.4	7.94	10.5	7.14	14.1	11	23	29	22
11	0.000	0	4.62	6.56	3.26	6.93	14.7	12.9	16	26	6.9	27
12	0.000	4	4.92	3.13	5.1	10.6	10.3	13.6	11	23	15	24

We can conclude that loans with home improvement purpose, amount greater than 23,500\$ and interest rate higher than 20.9% are by average 25% charged off or default

Here credit card loans are affected much more by the interest rate

	1	2	3	4	5	6	7	8	9	10	11	12
1	1.143	4.03	5.965	5.081	4.132	7.034	12.6	14.9	14.6	9.09	24	0
2	1.645	3.86	4.115	5.813	8.238	8.859	14.4	12	13.7	23.7	6.7	14
3	2.479	3.29	3.799	6.719	8.391	10.95	13	16.7	13.6	20	21	0
4	1.517	2.46	5.229	6.96	7.19	11.13	15.4	16.8	15	14.8	17	35
5	1.729	2.37	3.772	5.139	7.371	9.58	11	14.6	12.9	16.8	20	22
6	1.199	2.71	4.528	5.974	7.472	10.02	13.6	15.4	19.4	20.2	19	15
7	1.493	3.01	3.46	5.967	7.081	7.969	12.1	14.5	17	21.2	22	14
8	1.937	1.71	2.632	5.812	5.699	9.774	14.1	13.4	18.2	19.8	31	21
9	1.176	1.83	3.945	5.08	7.395	7.966	12.7	15.4	13.9	22.8	20	18
10	1.351	1.61	3.896	2.888	5.687	6.806	6.67	11.8	19.3	19.7	24	11
11	0.000	1.39	2.74	2.542	5.115	7.568	8.08	12	16.3	19.7	27	22
12	0.000	0.96	1.873	3.714	3.626	5.667	6.9	8.11	12.9	13.3	16	25

Charged off and default percentages start reaching 20% and higher at interest rate 20.9%

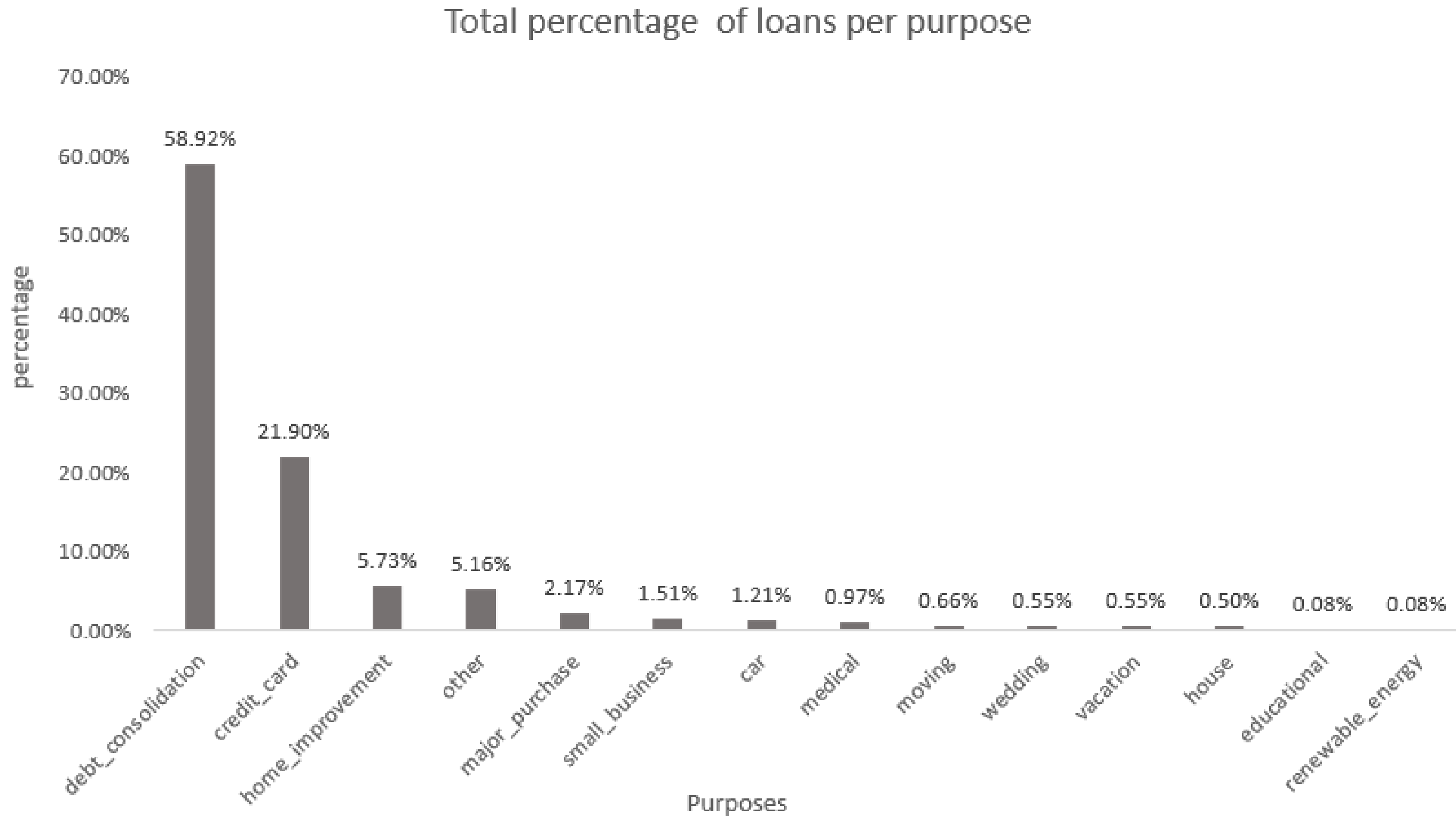
Loans with amount range 9,125%-12,000% and interest rate 24.34%-26.07% alone are almost with 35% defaults and charged off

The same is for loans with debt consolidation purpose

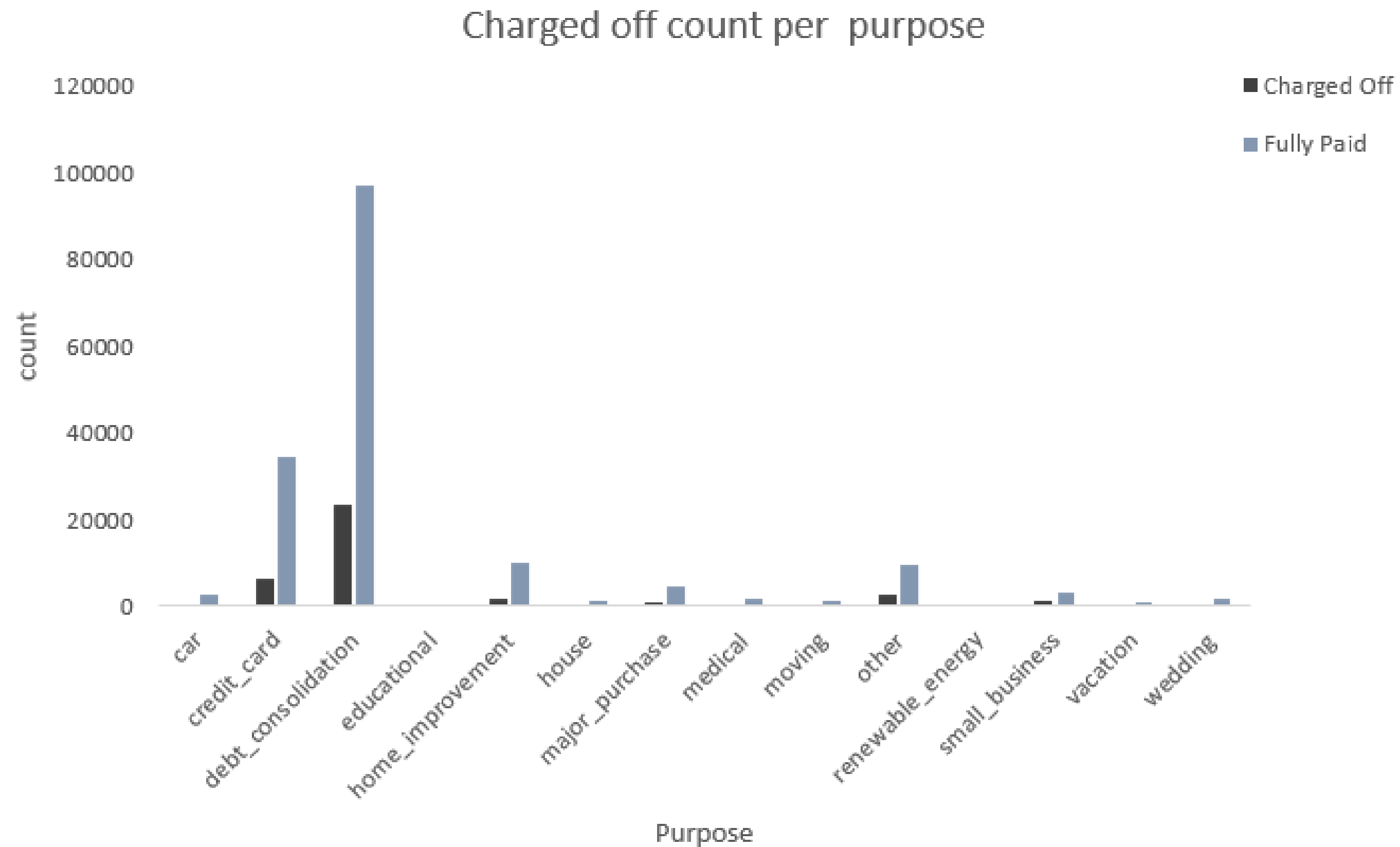
	1	2	3	4	5	6	7	8	9	10	11	12
1	4.3	6.5	7.5	9.1	7.1	10.4	16.0	16.9	14.1	15.3	7.1	11.8
2	2.8	4.4	5.4	8.1	8.7	11.0	14.2	14.9	16.4	13.6	19.5	22.8
3	2.4	4.0	5.9	7.1	8.0	11.3	14.0	17.1	18.3	19.3	24.2	20.9
4	2.6	4.5	5.7	7.5	8.2	11.9	14.2	16.4	16.2	18.6	16.2	22.0
5	1.4	3.7	4.8	6.9	7.6	9.3	12.4	15.9	15.2	18.4	21.9	17.4
6	1.1	3.2	4.6	7.3	7.4	9.8	13.9	16.0	17.5	20.9	23.5	22.1
7	1.8	2.2	4.1	6.7	7.5	9.9	13.8	17.8	16.4	21.1	22.8	21.2
8	1.3	2.7	4.5	5.2	7.9	7.9	13.5	13.8	18.5	18.6	26.9	18.5
9	0.0	2.2	3.9	5.5	6.2	7.6	12.2	15.1	16.9	19.0	19.5	20.5
10	1.1	2.0	4.9	4.0	7.8	8.6	11.3	15.3	15.9	21.1	22.5	18.2
11	2.3	0.9	3.1	5.6	4.8	6.8	9.8	12.2	14.1	18.9	23.7	24.3
12	3.7	1.7	2.4	3.8	4.7	6.4	8.4	10.8	14.4	17.9	21.4	19.5

Percentages of default and charged off loans is relatively much higher when interest rate exceeds 20.9%

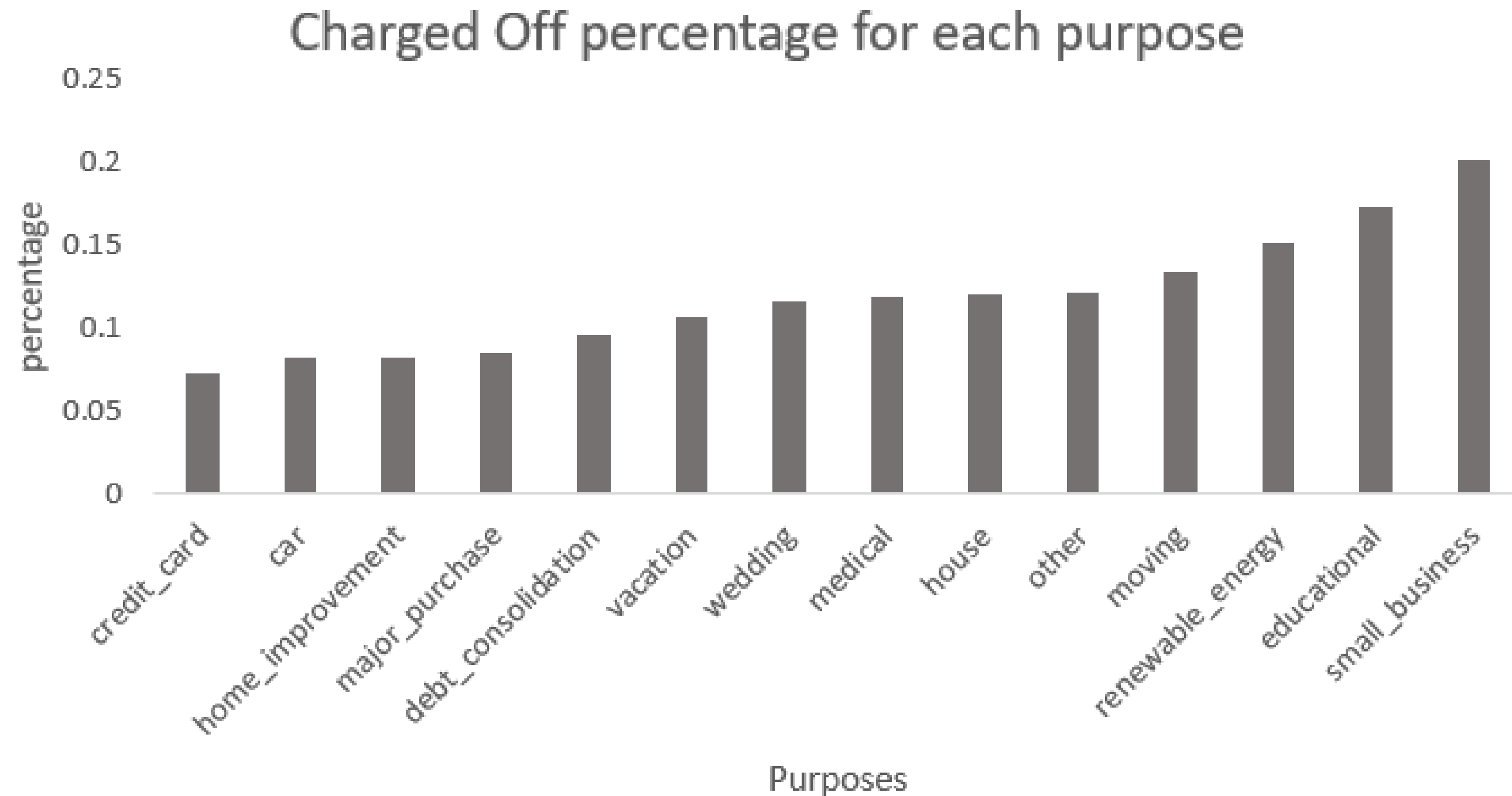
what is the most popular purpose ?




what is the most purpose with charged off numbers ?



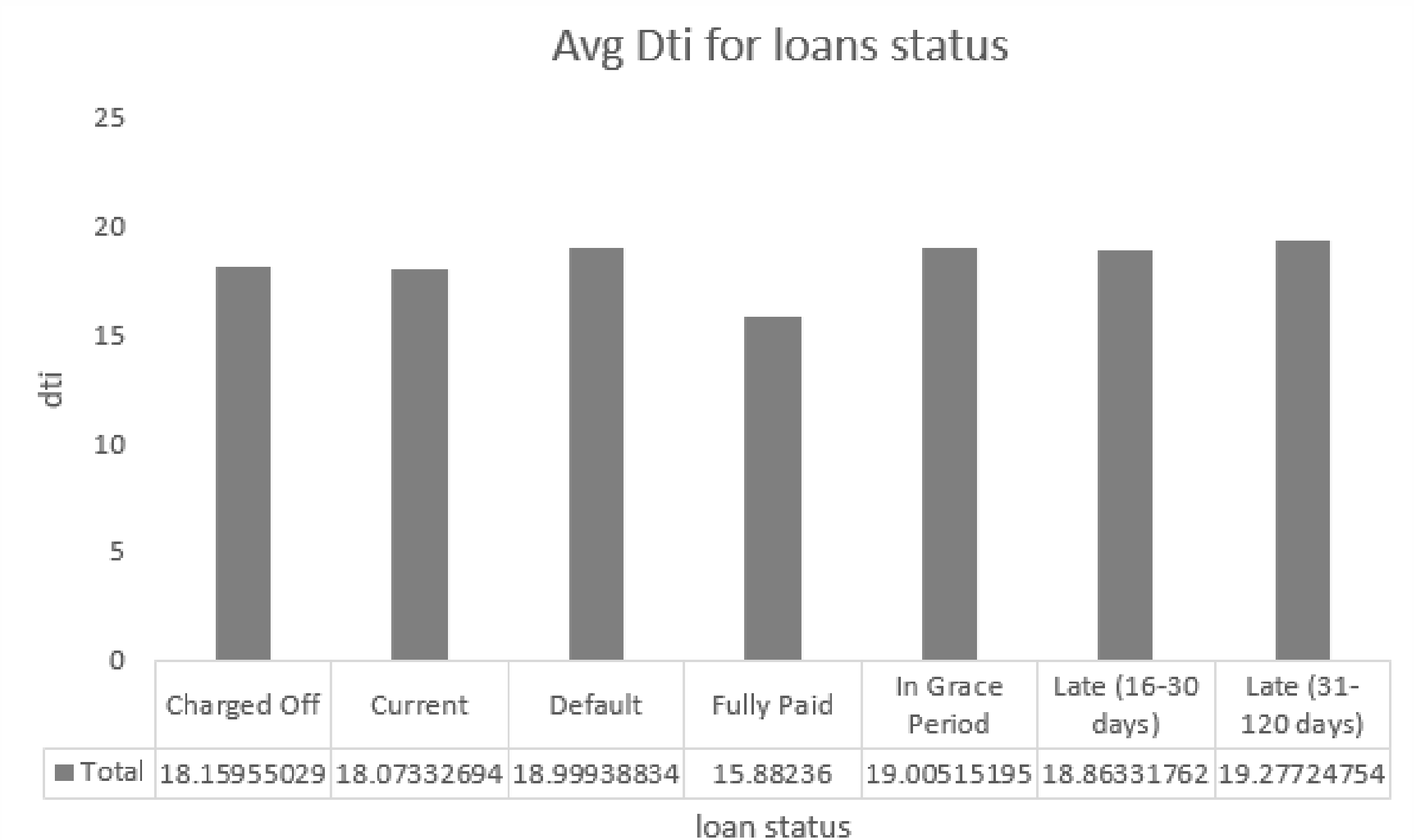
but what is the most purpose with charged off percentage depending on itself?



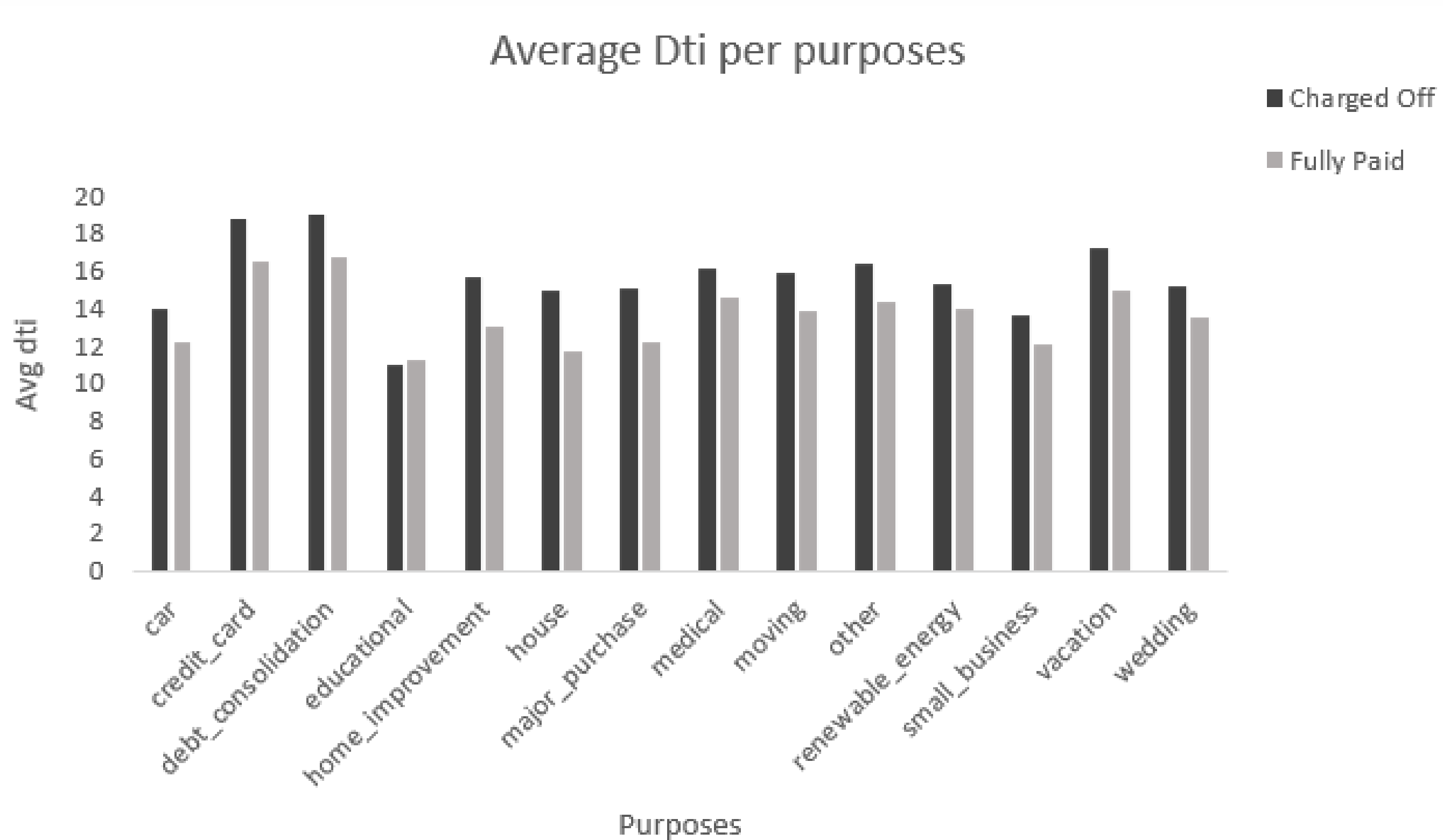


the most appropriate choice would be credit card, car, home improvement, purchases and debt consolidation.

Average DTI of loans



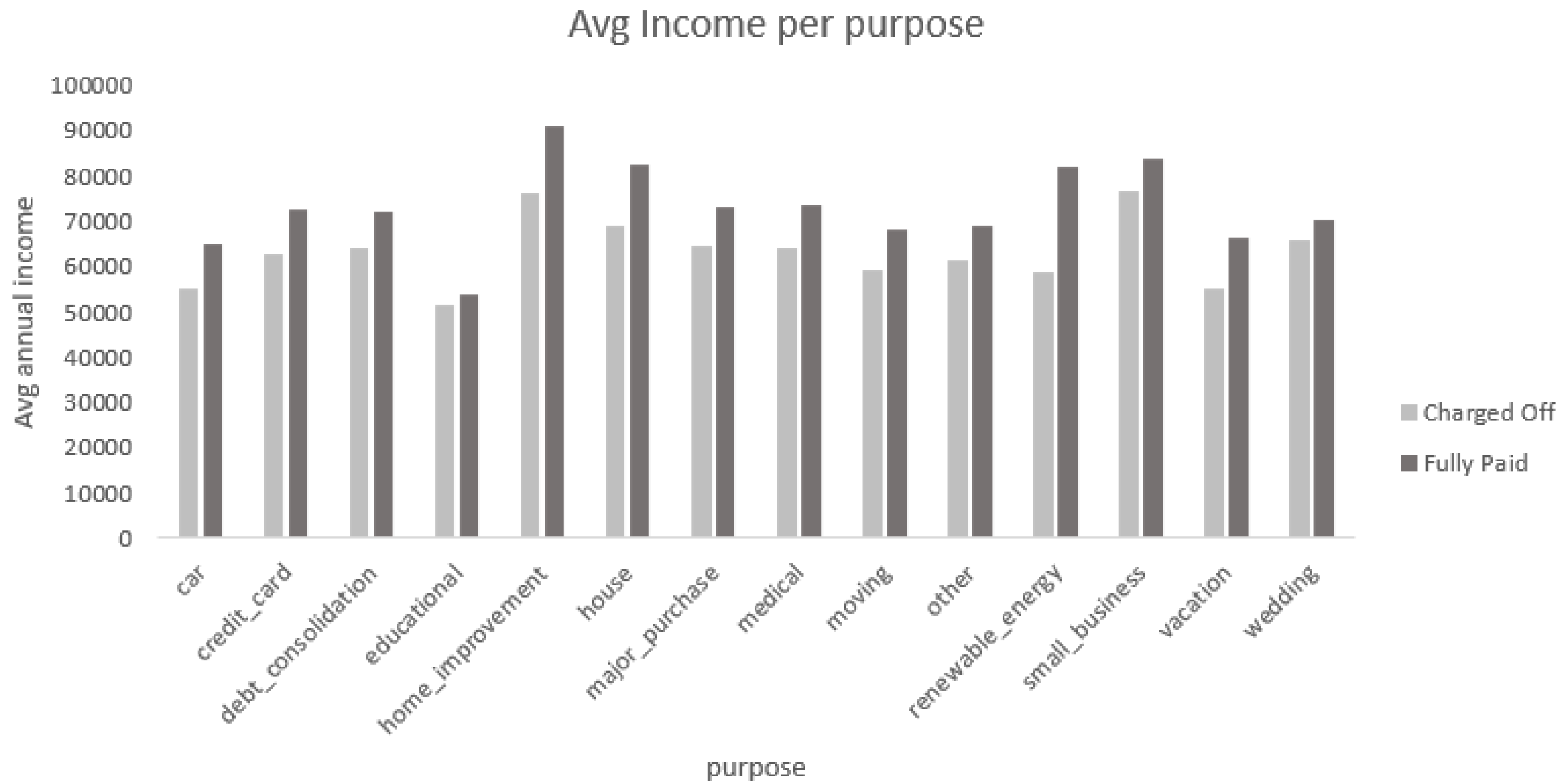
DTI per purpose



RECOMMENDATION

Purpose	Dti score
Small business	12 and below
Renewable energy	13-15 and below
Vacation	14-15 and below
Credit card	16-17 and below
Debt consolidation	16-18 and below
Other	14-15 and below

Average annual Income for loans

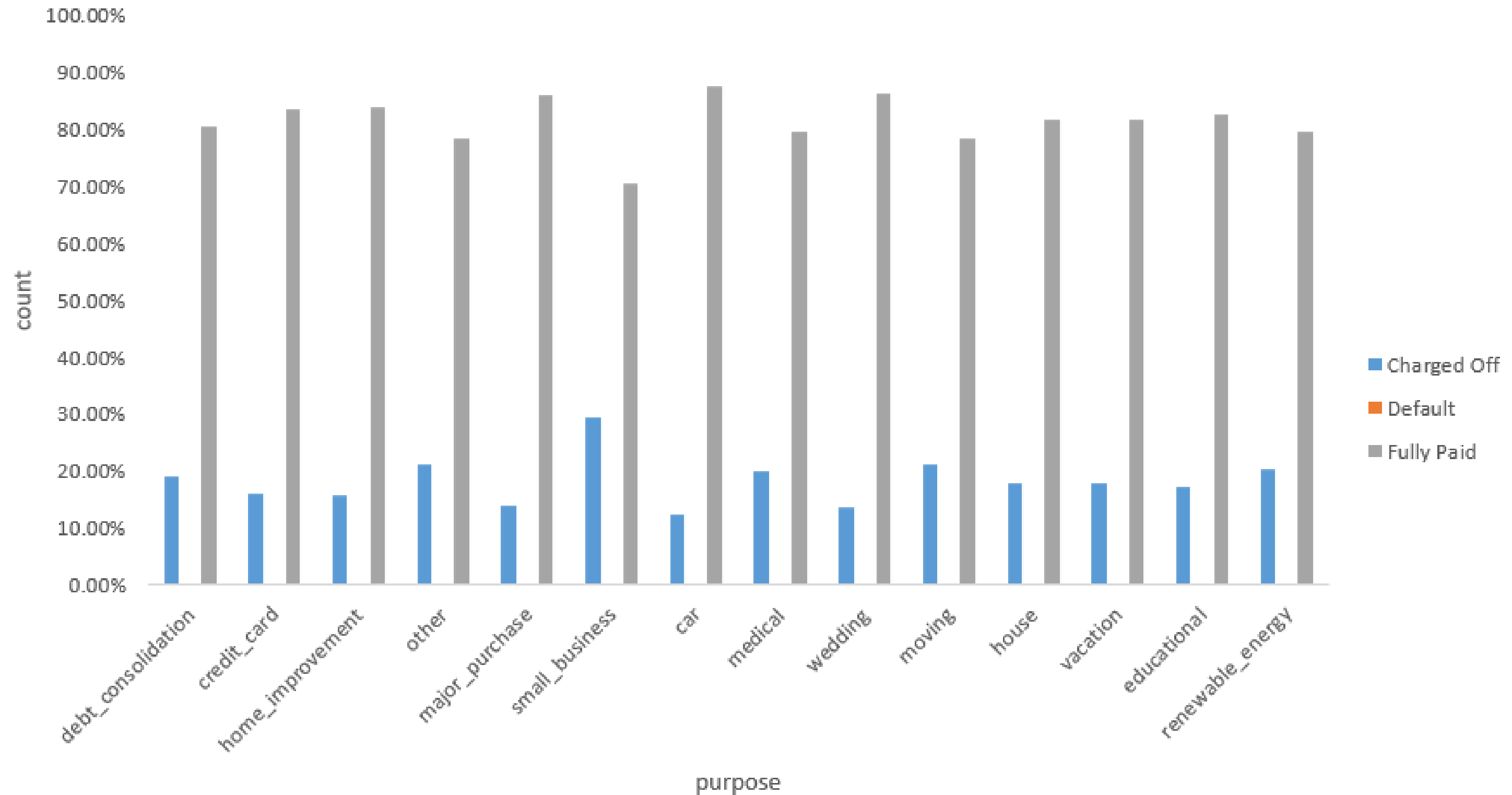


RECOMMENDATION

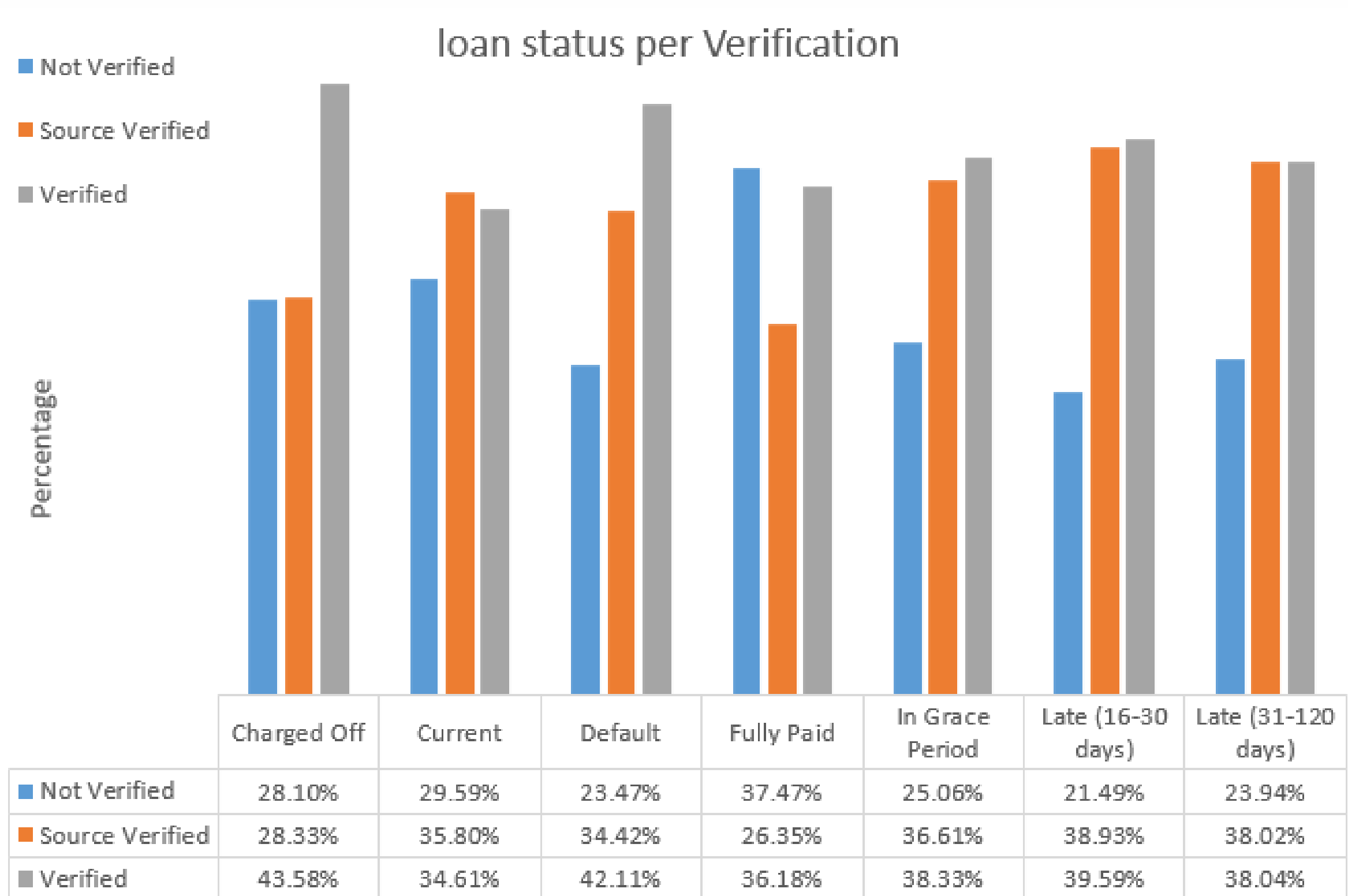
Purpose	Avg annual Income
Car	≥ 65000
Medical	≥ 70000
Vacation	≥ 60000
Credit card	≥ 69000
Debt consolidation	≥ 72000
Other	≥ 68000
Wedding	≥ 70000
Renewable_enregy	≥ 78000
Small_business	≥ 84000
Moving	≥ 66000

inquiries % per purpose

Number of Inquiries per purpose



Verification % per loan status



Thank You

Any Questions?

