Diversity Equity Inclusion

In Loans Dispersion

A marketing analytic report by:

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Focus of Analysis

Raw Data Overview:

	loan_id	gender	married	dependents	education	self_employed	applicant_income	co_applicant_income	loan_amount	loan_amount_term	credit_history	property_area
1	LP001015	Male	Yes	0	Graduate	0	5720	0	110	360	1	Urban
2	LP001022	Male	Yes	1	Graduate	0	3076	1500	126	360	1	Urban
3	LP001031	Male	Yes	2	Graduate	0	5000	1800	208	360	1	Urban
4	LP001035	Male	Yes	2	Graduate	0	2340	2546	100	360	NA	Urban
5	LP001051	Male	No	0	Not Graduate	0	3276	0	78	360	1	Urban
6	LP001054	Male	Yes	0	Not Graduate	0	2165	3422	152	360	1	Urban
7	LP001055	Female	No	1	Not Graduate	0	2226	0	59	360	1	Semiurban
8	LP001056	Male	Yes	2	Not Graduate	0	3881	0	147	360	0	Rural
9	LP001059	Male	Yes	2	Graduate	0	13633	0	280	240	1	Urban
10	LP001067	Male	No	0	Not Graduate	0	2400	2400	123	360	1	Semiurban
11	LP001078	Male	No	0	Not Graduate	0	3091	0	90	360	1	Urban
12	LP001082	Male	Yes	1	Graduate	0	2185	1516	162	360	1	Semiurban
13	LP001083	Male	No	0	Graduate	0	4166	0	40	180	NA	Urban
14	LP001094	Male	Yes	2	Graduate	0	12173	0	166	360	0	Semiurban
15	LP001096	Female	No	0	Graduate	0	4666	0	124	360	1	Semiurban
16	LP001099	Male	No	1	Graduate	0	5667	0	131	360	1	Urban
17	LP001105	Male	Yes	2	Graduate	0	4583	2916	200	360	1	Urban
18	LP001107	Male	Yes	0	Graduate	0	3786	333	126	360	1	Semiurban
19	LP001108	Male	Yes	0	Graduate	0	9226	7916	300	360	1	Urban
20	LP001115	Male	No	0	Graduate	0	1300	3470	100	180	1	Semiurban
21	LP001121	Male	Yes	1	Not Graduate	0	1888	1620	48	360	1	Urban
22	LP001124	Female	No	0	Not Graduate	0	2083	0	28	180	1	Urban
23	LP001128	NA	No	0	Graduate	0	3909	0	101	360	1	Urban
24	LP001135	Female	No	0	Not Graduate	0	3765	0	125	360	1	Urban
25	LP001149	Male	Yes	0	Graduate	0	5400	4380	290	360	1	Urban
26	LP001153	Male	No	0	Graduate	0	0	24000	148	360	0	Rural
27	LP001163	Male	Yes	2	Graduate	0	4363	1250	140	360	NA	Urban

Showing 1 to 28 of 367 entries, 12 total columns

Key DEI Indicators Based on Scope: *Gender* : Property Area, Education, Marriage, Dependents

Cleaned Raw Data:

Understanding of Analysis

	loan_id	gender	married	dependents	education	applicant_income	co_applicant_income	loan_amount	loan_amount_term	credit_history	property_area
1	LP001015	Male	Yes	0	Graduate	5720	0	110	360.0	1.0	Urban
2	LP001022	Male	Yes	1	Graduate	3076	1500	126	360.0	1.0	Urban
3	LP001031	Male	Yes	2	Graduate	5000	1800	208	360.0	1.0	Urban
4	LP001035	Male	Yes	2	Graduate	2340	2546	100	360.0	unavailable	Urban
5	LP001051	Male	No	0	Not Graduate	3276	0	78	360.0	1.0	Urban
6	LP001054	Male	Yes	0	Not Graduate	2165	3422	152	360.0	1.0	Urban
7	LP001055	Female	No	1	Not Graduate	2226	0	59	360.0	1.0	Semiurban
8	LP001056	Male	Yes	2	Not Graduate	3881	0	147	360.0	0.0	Rural
9	LP001059	Male	Yes	2	Graduate	13633	0	280	240.0	1.0	Urban
10	LP001067	Male	No	0	Not Graduate	2400	2400	123	360.0	1.0	Semiurban

- **Gender: No reporting = Unknown**
- **Dependents[0] = No dependents**
- **Co Applicant Income: Unclear Data Reporting (is it monthly income?)**
- **Credit history: 1 = Passed, 0 = Failed, No Reporting = unavailable**

***Note Quality of data collected affects the quality of insights**

Key Indicators

Gender: **Male**
Median Loan Amount: **130.00**

Gender: **Female**
Median Loan Amount: **112.50**

- **The median loan amount for men was 15% higher than women**

How it compares to other data

RE S E AR C H RE P O R T: Women Are Better than Men at Paying Their Mortgages Laurie Goodman Jun Zhu Bing Bai September 2016

The Urban Institute:
https://www.urban.org/sites/default/files/publication/84206/2000930-Women-Are-Better-Than-Men-At-Paying-Their-Mortgages.pdf

- Public data analyzed by the urban institute on loan origination collected by Home Mortgage Disclosure Act (HMDA), found that the median loan size difference between men and women was 13% with a 700 Fico score.

*factors to consider. This data is 12 years old. We could not adequately compare our data against the FICO score

Category	FICO score	LTV	DTI	Loan size ($000s)	Income ($000s)	Loan size/ income
						Full sample
Female only	711	75.07	33.25	176.41	69.22	2.91
Male only	712	77.63	33.11	202.94	94.72	2.66
Male-female	725	74.43	32.96	227.60	119.48	2.26
Female-male	718	75.86	33.29	213.24	110.23	2.25
Female-female	714	76.35	33.73	210.11	105.92	2.39
Male-male	717	77.37	33.27	230.42	151.38	2.11
All	**718**	**75.64**	**33.10**	**208.33**	**101.18**	**2.52**
						2004-07
Female only	684	74.35	30.70	181.96	69.74	2.90
Male only	686	76.20	30.44	203.58	93.91	2.64
Male-female	694	74.38	30.27	220.53	108.48	2.35
Female-male	686	75.48	30.74	207.82	99.72	2.35
Female-female	686	75.18	30.85	205.47	98.15	2.44
Male-male	694	76.31	29.98	226.12	149.32	2.11
All	*688*	*75.04*	*30.46*	*205.18*	*94.68*	*2.57*
						2008-10
Female only	732	73.98	36.08	170.29	66.23	2.95
Male only	731	76.82	36.11	197.65	91.51	2.74
Male-female	743	72.13	34.88	229.41	122.61	2.27
Female-male	735	74.33	35.55	215.78	113.17	2.26
Female-female	727	76.30	36.72	212.08	107.38	2.40
Male-male	729	77.64	36.75	228.56	145.86	2.16
All	*737*	*74.00*	*35.53*	*208.25*	*102.75*	*2.53*
						2011-14
Female only	741	76.82	36.19	171.24	70.16	2.89
Male only	739	80.08	35.94	204.89	97.67	2.65
Male-female	748	75.83	35.07	234.17	129.75	2.17
Female-male	744	77.19	35.34	218.17	121.34	2.13
Female-female	741	77.92	36.16	215.00	115.44	2.30
Male-male	742	78.68	36.34	237.75	157.96	2.08
All	*744*	*77.35*	*35.57*	*212.43*	*108.72*	*2.44*

Key Indicators

Education: Graduate
Gender: Male
Median Loan Amount: 131.50

Education: Not Graduate
Gender: Male
Median Loan Amount: 122.00

Education: Graduate
Gender: Female
Median Loan Amount: 110.00

Education: Not Graduate
Gender: Female
Median Loan Amount: 117.00

- The median loan amount for men with were a graduate degree was 18% higher than women who were a graduate
- The median loan amount for men who were not a graduate was 4% higher than women with who was not a graduate

Gender/Education/LoanAmt

Key Indicators

- The median loan amount for men in Urban areas was was 13% higher than women in urban areas

- The median loan amount for men in Rural areas was 5% higher than women in rural areas

- The median loan amount for men in semi-urban areas was 17% higher than women in semi-urban areas

Men were more likely to receive a higher loan amount than women for homes in semi-urban areas

Key Indicators

- The median loan amount for unmarried men was 10% higher than unmarried women
- The median loan amount for married men was 13% higher than married women

Further Findings

Statistical Testing

```r
{r}

t.test(df_overview4['dependents'], df_overview4['loan_amount'])
```

```
        Welch Two Sample t-test

data:  df_overview4["dependents"] and df_overview4["loan_amount"]
t = -42.579, df = 366.11, p-value < 2.2e-16
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -141.7593 -129.2434
sample estimates:
 mean of x  mean of y
  0.479564 135.980926
```

Interpretation:

The p-value < 2.2e-16, is scientific notation for the equivalent of p < .00000000000000016. Therefore, we can conclude conclude that there is a significant (positive) relationship between dependents, and loan amount dispersion.

Key Indicators

Conclusion

In conclusion:

When comparing loan amount to gender in the domains of **Property Area, Education, Marriage, Dependents** men obtained larger mortgage loans to purchase homes.

THANKS!

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Task 2
PHASE 2
Task 1
Task 2

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