Analyzing the Effects of Down Payment Assistance Programs on Foreclosure Rates in Covington, Kentucky

Research Practicum

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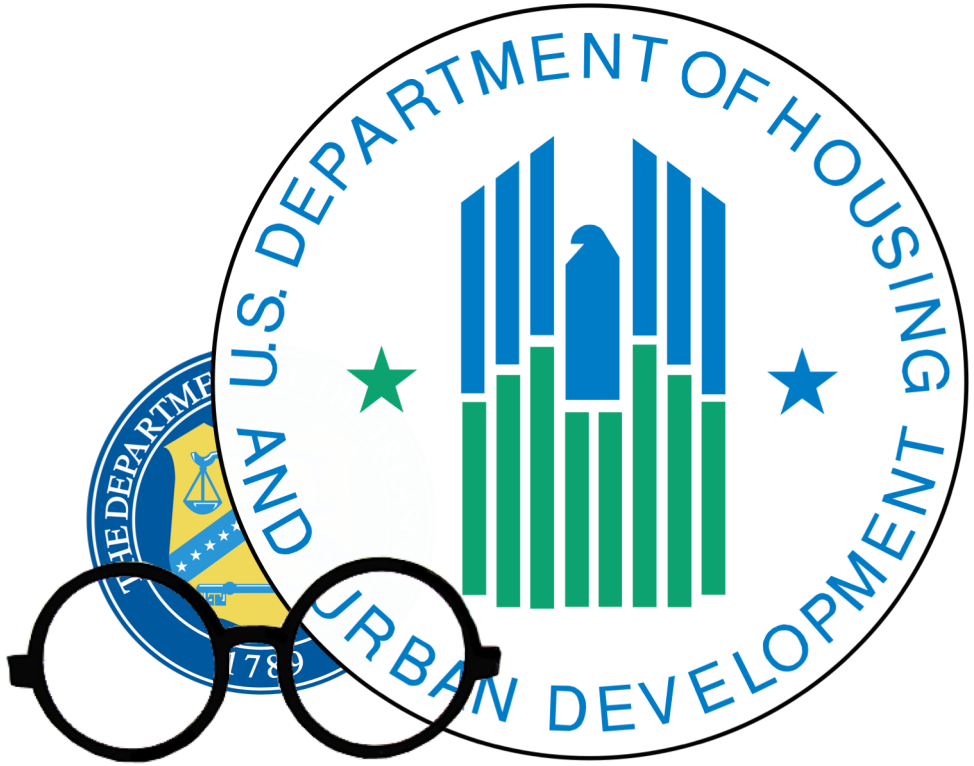
US19

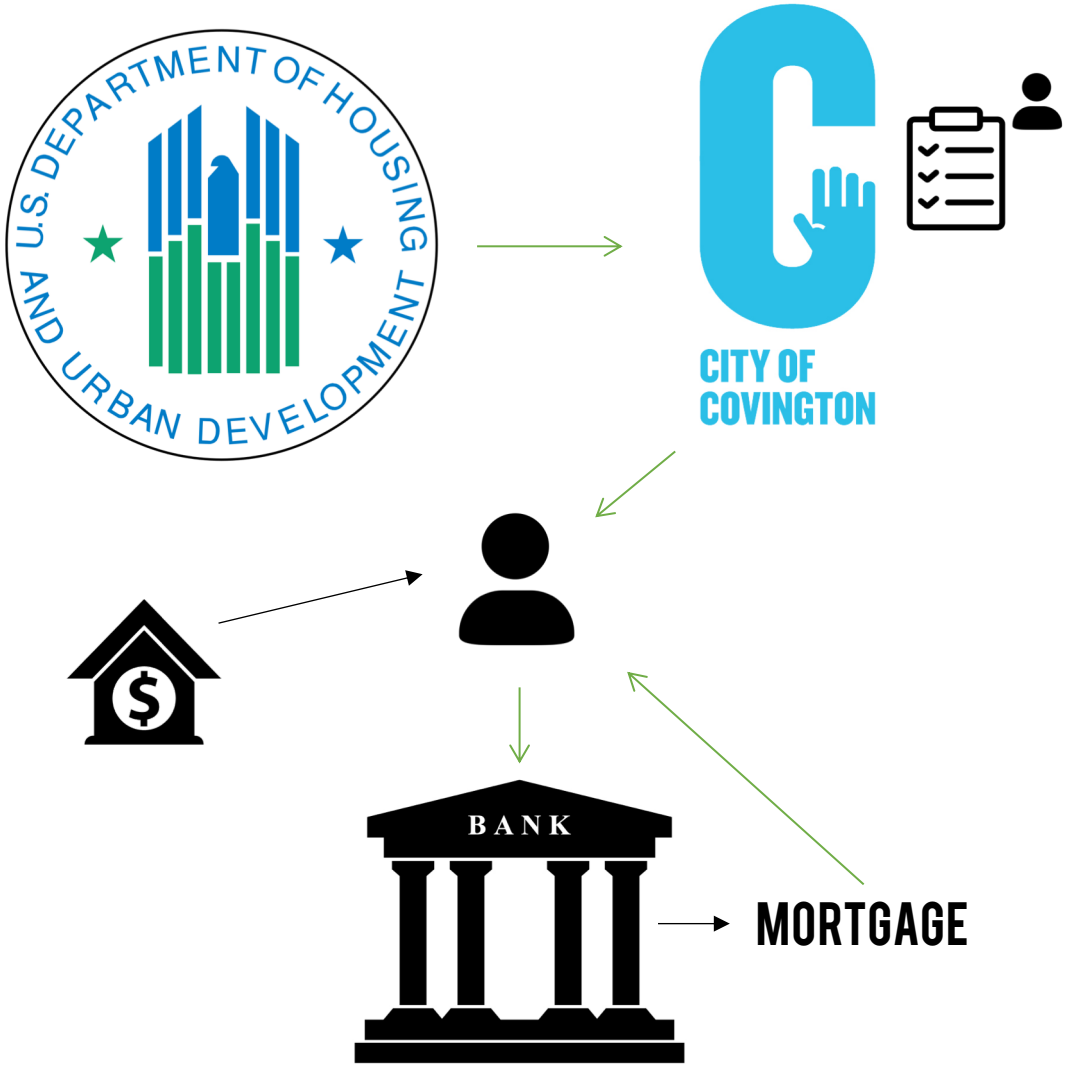
CAUSE OF A PROBLEM

- HUD proritizes homeownership in the United States
- Housing and Community Development Act of 1974 secured funding and added protections for renters and mortgage lessees
- More recently, banks abused credit accessed and a housing bubble began to come to frutition in 2006, which was a major cause of the Great Recession
- This led to "Fanny and Freddie" entering into government conservatorship in 2008.



BRIEF OVERVIEW OF HAP

- Through the Housing and Community Development Act of 1974, Community Development Block Grant Program was established
- One type of block grant is used to help homebuyers under certain socioeconomic conditions to be able to recieve aid from the government
- Covington is part of the Northern Kentucky Housing Consortium, a collection of municpal governments, which works to help residents pay certain housing costs such as closing costs and downpayments through a forgiveable loan



LITERATURE REVIEW

- Little research directly investigates the relationship between down payment assistance and default (Freedman, Harden, 2015)
  - They found that low and moderate-income homeowners who have used down payment assistance programs show no difference mortgage performance between those who used down payment assistance versus those who did not.
- Another study from Case Western investigated mortgages in Cuyahoga County, Ohio (Coulton, et. all, 2008)
  - This study concluded the leading indicator that resulted in a *lis pendens* filiing in civil court was due to subprime lending, and that certain lenders were more likely to file suit than others.

DATA

TYPES:

- Land Parcel Information
- Montly Sales data (2014-2018) for all parcels in Covington
- Foreclosure data by parcel
- Descriptive structure information including:
  - Squarefootage (sqft); and
  - Year of construction (age)
- HAP participants by year (organized by parcel)
- Three cohorts were created from this data: 2014, 2015, and 2016

SOURCES:

SUMMARY STATISTICS

2014 Property Sales Summary Statistics

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
hap	473	0.04	0.2	0	0	0	1
fdummy	473	0.1	0.3	0	0	0	1
sdummy	473	0.4	0.5	0	0	1	1
spell	473	44.6	20.5	1	30	60	60
saleval	464	10.9	0.8	7.7	10.3	11.4	13.3
sqft	473	7.4	0.4	6.4	7.1	7.6	8.4
age	473	4.4	0.6	1.1	4.3	4.7	5.4

2015 Property Sales Summary Statistics

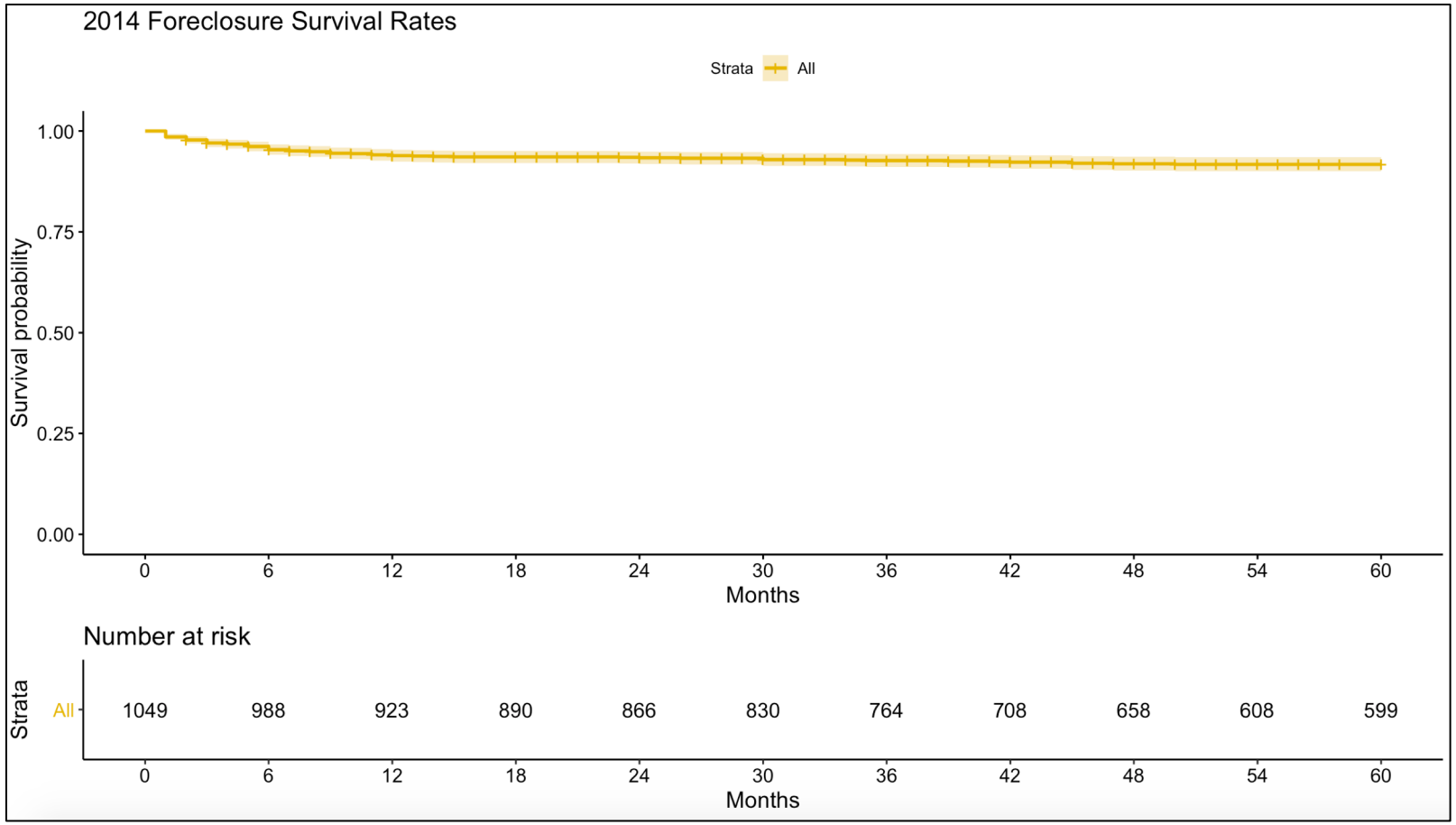
Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
hap	525	0.05	0.2	0	0	0	1
fdummy	525	0.1	0.3	0	0	0	1
sdummy	525	0.3	0.5	0	0	1	1
spell	525	38.0	15.1	1	27	48	48
age	525	4.3	0.9	0.0	4.1	4.7	5.2
sqft	525	7.4	0.4	6.5	7.1	7.6	8.7
saleval	525	10.9	1.1	0.0	10.4	11.5	13.7

2016 Property Sales Summary Statistics

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
hap	465	0.1	0.3	0	0	0	1
age	465	4.4	0.7	0.0	4.5	4.7	5.4
sqft	465	7.4	0.4	6.1	7.1	7.6	9.3
saleval	465	10.9	1.3	0.0	10.5	11.5	14.3
spell	465	27.9	11.4	2	16	36	36
fdummy	465	0.1	0.3	0	0	0	1
sdummy	465	0.3	0.5	0	0	1	1

SURVIVAL REGRESSION

- What is it?
- What does it measure?
- Can you use this for economics?
- Has anyone done this for real estate before?



IMPORTANT EQUATIONS

EQ 1.

$$hazard,\ h(t) = h_0(t) * \exp\left(ß_{HAP_i}x_1 + ß_{saleval_i}x_2 + ß_{age_i}x_3 + ß_{sqft_i}x_4\right);$$

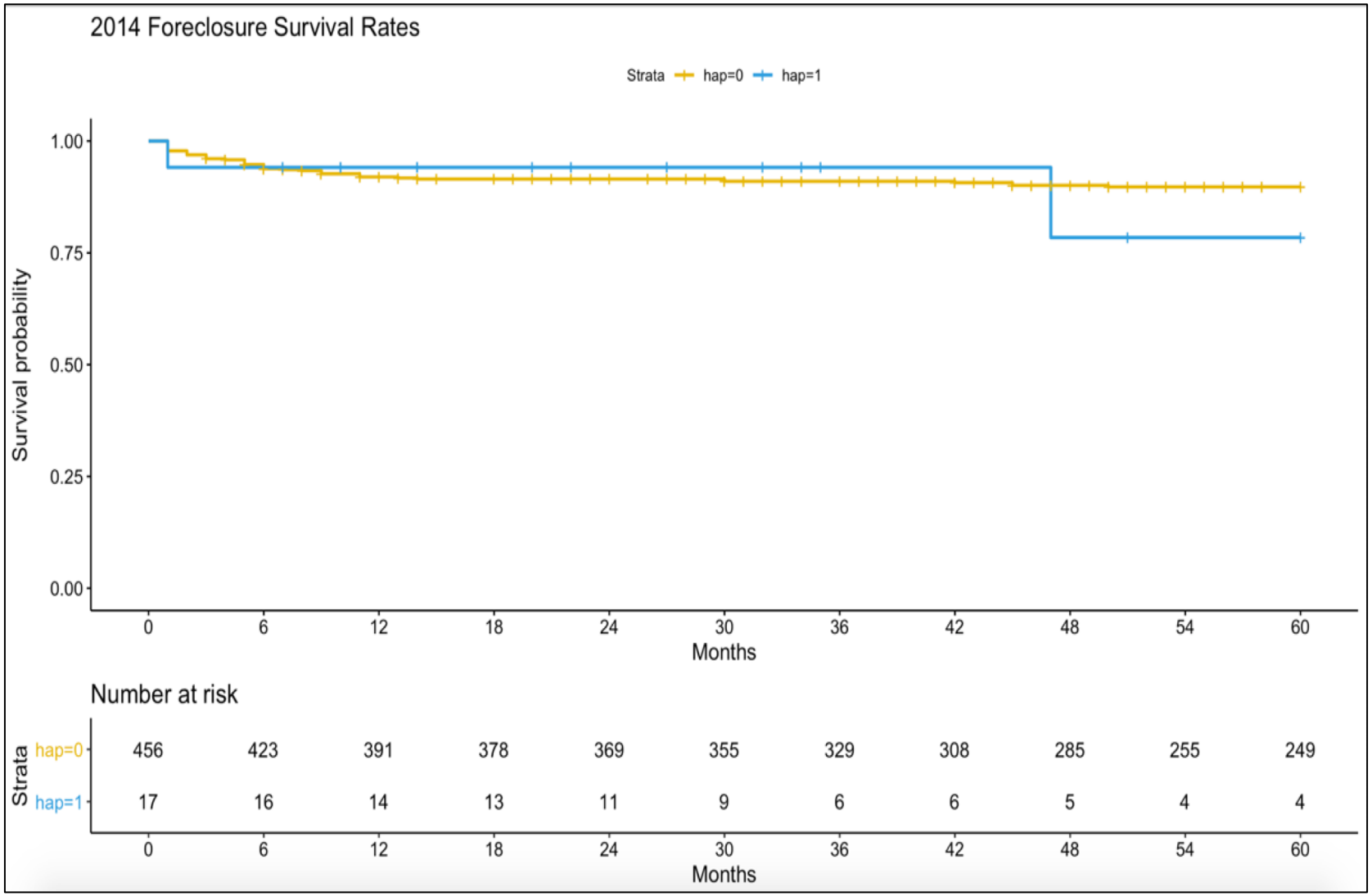
Wherein each explanatory variable represents a static measure from time $t = 0$, until a censor event is triggered at $t = t_i$

EQ 2.

$$survival\ probability,\ \hat{S}(t) = \prod_{i:t_i \leq t}\left(1 - \frac{d_i}{n_i}\right);$$

Where time t_i represents a time in which at least one censor event has occurred, d_i the number of events (i.e., foreclosures or sales) that happened at t_i and n_i the *individuals known to have survived* (indicating they have not yet been censored), up to time t_i (Kaplan, Meier, 1958)

EMPIRICAL RESULTS



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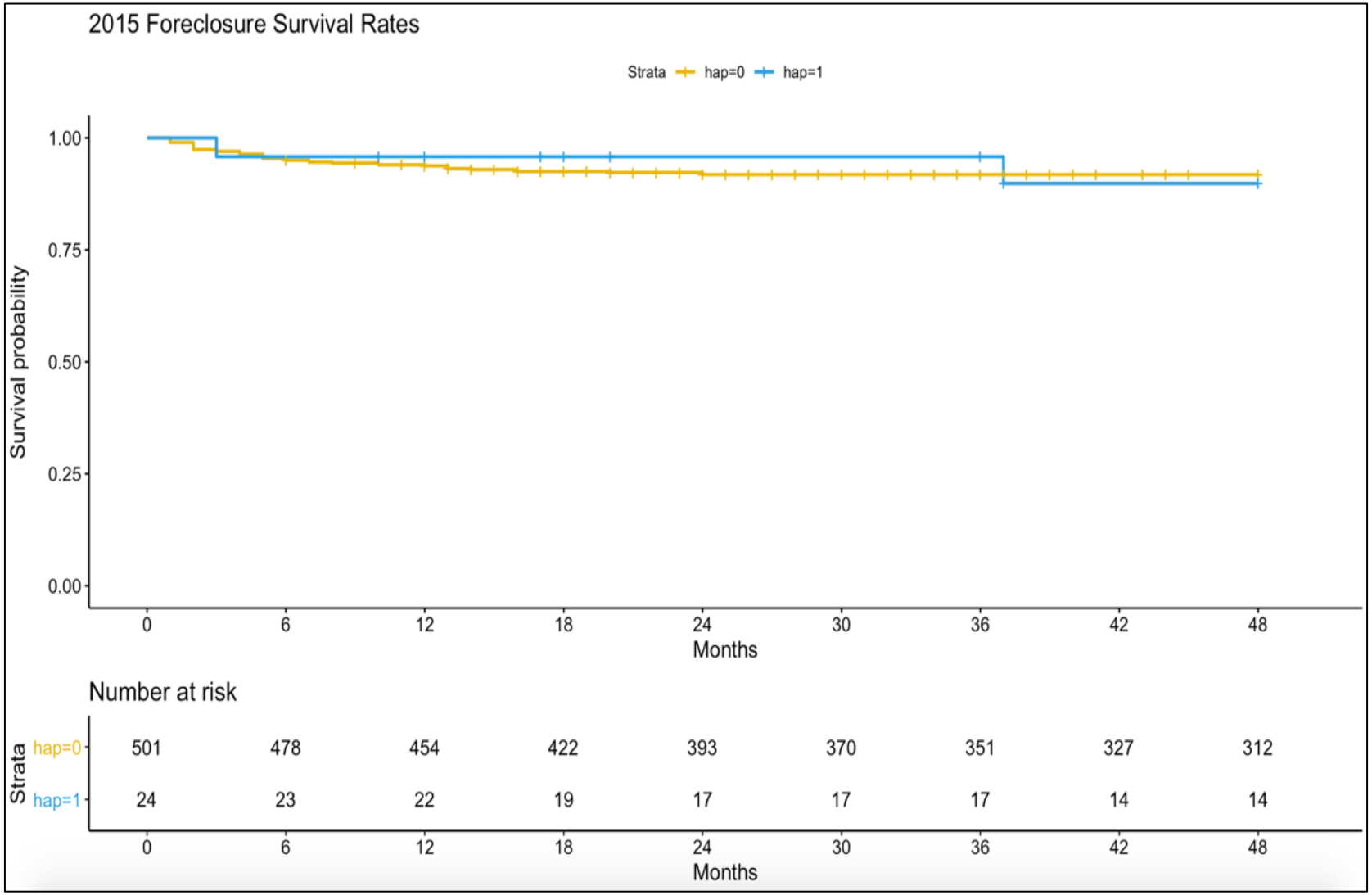

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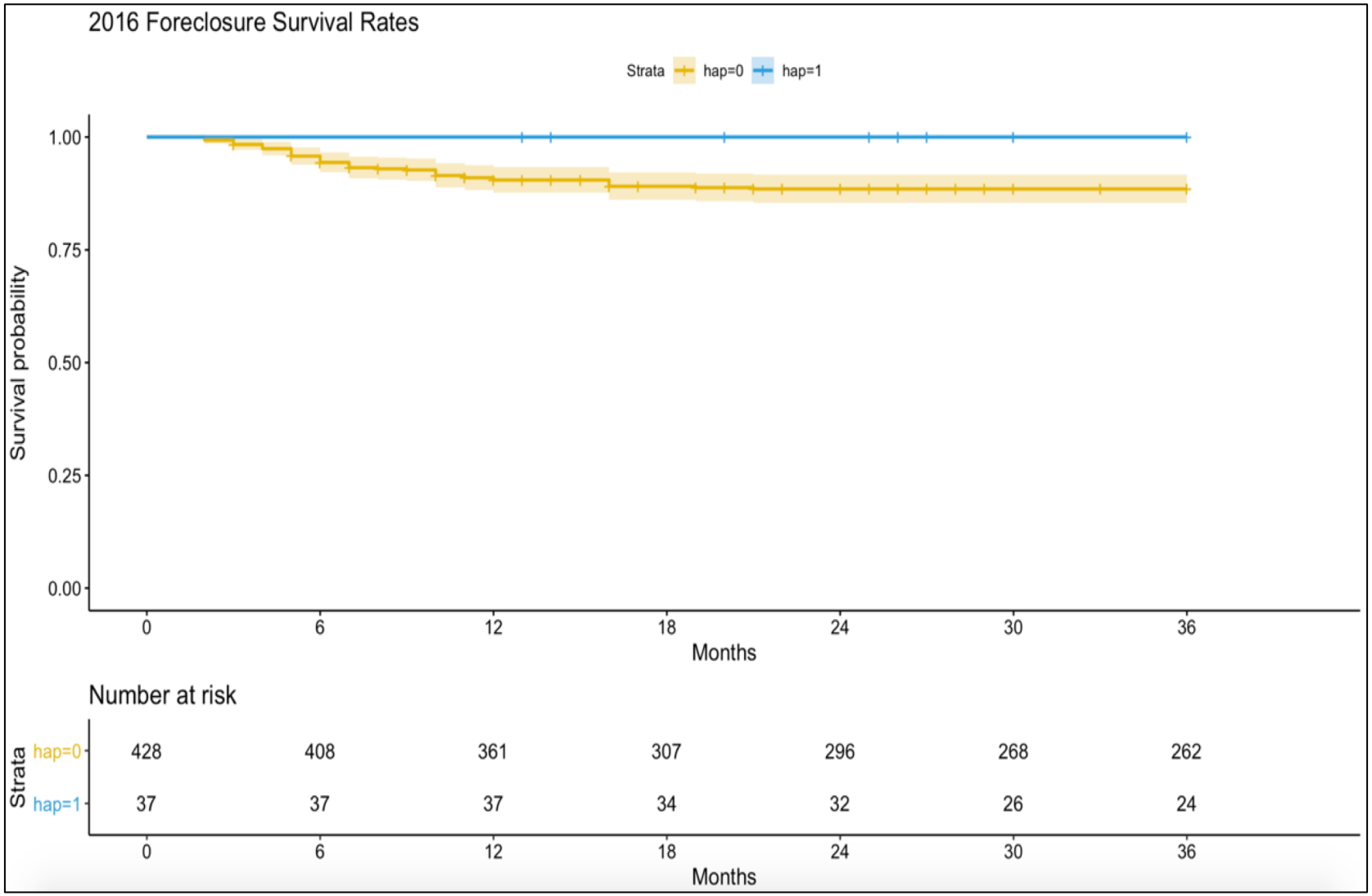

EMPIRICAL RESULTS

Cox Proportional Analysis of Foreclosure Rates

	Dependent variable:		
	spell		
Cohort	(2014)	(2015)	(2016)
hap	0.278	0.052	-17.144
	(0.723)	(0.725)	(2,511.273)
Observations	473	525	465
R^2	0.0003	0.00001	0.018
Max. Possible R^2	0.692	0.629	0.706
Log Likelihood	-278.299	-260.263	-280.254
Wald Test (df = 1)	0.150	0.010	0.000
LR Test (df = 1)	0.136	0.005	8.452***
Score (Logrank) Test (df = 1)	0.149	0.005	4.423**
Note:			*p<0.1;**p<0.05;***p<0.01

Cox Proportional Analysis of Foreclosure Rates

	Dependent variable:		
	spell		
	(2014)	(2015)	(2016)
saleval	0.107	-0.155	-0.070
	(0.206)	(0.115)	(0.098)
hap	0.458	-0.021	-17.262
	(0.726)	(0.727)	(2,543.237)
age	1.091**	0.365	-0.062
	(0.485)	(0.334)	(0.207)
sqft	-0.598	-0.688*	-0.726*
	(0.433)	(0.415)	(0.371)
Observations	464	525	465
R^2	0.021	0.018	0.029
Max. Possible R^2	0.690	0.629	0.706
Log Likelihood	-266.664	-255.530	-277.589
Wald Test (df = 4)	6.710	8.190*	5.180
LR Test (df = 4)	9.618**	9.471*	13.784***
Score (Logrank) Test (df = 4)	7.081	8.566*	9.769**
Note:			*p<0.1;**p<0.05;***p<0.01

Hazard Table

Covariate (p-value)	Cohort: (2014)	(2015)	(2016)
saleval	1.11	0.86	0.93
	(0.603)	(0.177)	(0.473)
hap	1.58	0.98	3.19e-8
	(0.528)	(0.977)	(0.995)
age	2.98**	1.44	0.94
	(0.025)	(0.275)	(0.765)
sqft	0.55	0.50*	0.484*
	(0.168)	(0.097)	(0.051)

Note :*p<0.1; **p<0.05; ***p<0.01

CONCLUSIONS