## FIN3210 Week 2 Assignment Report Ma Kexuan 120090651

#### **Abstract**

This report provides a descriptive summary statistic for the dataset given, and construct several regressions to discover how borrower characteristics affect the outcome of default likelihood, the number of bids. Furthermore, we discover the relation between the platform default likelihood and platform characteristics.

### **Data Preprocessing**

The preprocessing procedures and some interpretations of the code are described in each code blocks in the appendix, please check.

#### **Ouestions**

1) Present two tables for the summary statistics of the key variables in Renrendai loans.xlsx and p2p lending platforms.xlsx

In the table of Renrendai loans.xlsx, I choose 'BIDS', 'DEFAULT', 'AMOUNT', 'INTEREST', 'MONTHS', 'CREDIT', 'HOUSE', 'CAR', 'HOUSE\_L', 'CAR\_L', 'EDUCATION', 'WORKTIME', 'INCOME', 'AGE' as the key variables, the summary statistics is described as the left chart below. It's worth noting that the mean value of default is 0.15, meaning that about 85% percent of people have been rejected from loaning the money. In the table of p2p lending platforms.xlsx, I choose 'OnlineTime\_YMD', 'Bankrupt\_WDZJ', 'Collapse','Benign', 'Fraud', 'RegCapital', 'Capitaldeposit', 'Obtaininvest', 'Joinasso', 'Autobid', 'Transright','Riskdeposit','Thirdguarantee' as the key variables, the summary statistics is described as the right chart below. The Collapse variable has a mean of 78%, meaning that 78% percent of the platforms have already collapsed, indicating a high risk of default.

	count	mean	std	min	25%	50%	75%	max									
BIDS	10000.0	24.150600	41.342608	1.0	9.0	15.0	24.0	592.0									
DEFAULT	10000.0	0.151300	0.358359	0.0	0.0	0.0	0.0	1.0		count	mean	std	min	25%	50%	75%	max
AMOUNT	10000.0	24545.835000	38280.756524	3000.0	8000.0	14400.0	26000.0	500000.0	Collapse	1000.0	0.782000	0.413094	0.0	1.0	1.0	1.0	1.0
INTEREST	10000.0	12.621900	2.273689	5.0	11.0	12.0	13.0	24.4	Benign	782.0	0.098465	0.298134	0.0	0.0	0.0	0.0	1.0
MONTHS	10000.0	12.237300	8.091090	3.0	6.0	12.0	12.0	36.0	Fraud	782.0	0.246803	0.431427	0.0	0.0	0.0	0.0	1.0
CREDIT	10000.0	2.146300	1.530990	1.0	1.0	2.0	3.0	7.0	RegCapital	1000.0		2328.221711	2.0	100.0	300.0	500.0	50000.0
HOUSE	10000.0	0.564500	0.495847	0.0	0.0	1.0	1.0	1.0	Capitaldeposit		0.191000	0.393286	0.0	0.0	0.0	0.0	1.0
CAR	10000.0	0.391700	0.488155	0.0	0.0	0.0	1.0	1.0	11.5/11/1/15/16/16								
HOUSE_L	10000.0	0.228400	0.419823	0.0	0.0	0.0	0.0	1.0	Obtaininvest	968.0	0.026860	0.161756	0.0	0.0	0.0	0.0	1.0
CAR_L	10000.0	0.082200	0.274683	0.0	0.0	0.0	0.0	1.0	Joinasso	968.0	0.054752	0.227613	0.0	0.0	0.0	0.0	1.0
EDUCATION	9996.0	2.165966	0.818108	1.0	2.0	2.0	3.0	4.0	Autobid	1000.0	0.244000	0.429708	0.0	0.0	0.0	0.0	1.0
WORKTIME	9994.0	2.838003	0.992755	1.0	2.0	3.0	4.0	4.0	Transright	1000.0	0.177000	0.381860	0.0	0.0	0.0	0.0	1.0
INCOME	9998.0	4.309162	1.335842	1.0	3.0	4.0	5.0	7.0	Riskdeposit	968.0	0.021694	0.145758	0.0	0.0	0.0	0.0	1.0
AGE	10000.0	34.755500	6.682708	24.0	30.0	33.0	38.0	53.0	Thirdguarantee	968.0	0.034091	0.181557	0.0	0.0	0.0	0.0	1.0

2) Perform a logit regression and examine the relation between the default likelihood and borrower characteristics such as credit, house, car, education, work time, etc.

In this Logit regression, I use 'CREDIT', 'HOUSE', 'CAR', 'HOUSE\_L', 'CAR\_L', 'EDUCATION', 'WORKTIME', 'INCOME', 'AGE' as the independent variables, the result at the left below shows that all the variables chosen except for CAR\_L and WORKTIME have 99% significance level. Among the significant coefficients, CREDIT, CAR, HOUSE L and

EDUCATION are negatively correlated with the dependent variable default. This can show that the platform has an accurate credit rating for users, and the higher the credit, the lower the default risk. Users with cars are likely to have good living conditions and a low probability of default, just as those with mortgages are. Higher education may mean higher quality and lower probability of default. However, for the positive ones, the larger the AGE, the more likelihood to default, since they may not earn enough money. But for the INCOME, it's quite weird to get the result, to explain it, maybe we should do more research to figure out the logic underneath.

							Dep. Vari	able:		BIDS	R-s	quared:	0.173
Dep. Varia	blo	DEE	AULT N	o Obeo	rvations:	9990	Me	odel:		OLS	Adj. R-s	quared:	0.172
							Met	hod:	Least Sq	uares	F-s	tatistic:	232.1
Mo	del:		Logit	Df R	esiduals:	9980	ı	Date: Th	u, 28 Sep	2023 Pr	ob (F-st	tatistic):	0.00
Meti	nod:		MLE		of Model:	9		ime:	00:		Log-Like	elihood:	-50383.
D	ate: The	u, 28 Sep	2023	Pseud	o R-squ.:	0.2236	No. Observati			9990			1.008e+05
Т	ime:	00:0	01:17	Log-Lil	kelihood:	-3298.0	Df Resid			9980		BIC:	1.009e+05
		, , ,		Log Li	LL-Null:		Df Me		2002	9			
conver	gea:		True		LL-Null:		Covariance 1	ype:	nonr	obust			
Covariance T	ype:	nonre	obust	LLR	p-value:	0.000		coef	std err	t	P> t	[0.025	0.975]
	conf	std err		P> z	[0.025	0.9751	const	-50.8110	2.479	-20.497	0.000	-55.670	-45.952
			Z				CREDIT	1.8652	0.257	7.248	0.000	1.361	2.370
const	0.5155	0.212	2.427	0.015	0.099	0.932	HOUSE	1.6099	0.926	1.738	0.082	-0.206	3.426
CREDIT	-1.8927	0.082	-23.044	0.000	-2.054	-1.732	CAR	4.2582	0.918	4.637	0.000	2.458	6.059
HOUSE	0.1438	0.073	1.968	0.049	0.001	0.287	HOUSE_L	-7.1289		-6.924	0.000	-9.147	-5.111
CAR	-0.4586	0.080	-5.708	0.000	-0.616	-0.301	CAR_L	-7.1951		-4.854	0.000	-10.101	-4.290
HOUSE L	-0.3307	0.091	-3.633	0.000		-0.152	EDUCATION	-2.0042		-4.218	0.000	-2.936	-1.073
_							WORKTIME	2.4355		5.721	0.000	1.601	3.270 9.831
CAR_L	0.1620	0.134	1.207	0.228	-0.101	0.425	AGE	9.2260		12.235	0.000	8.622 0.682	0.943
EDUCATION	-0.4156	0.040	-10.426	0.000	-0.494	-0.337	AGE	0.6120	0.000	12.233	0.000	0.002	0.943
WORKTIME	0.0090	0.034	0.264	0.792	-0.058	0.076	Omnibu	us: 1160	2.380	Durbin-W	atson:	1	1.743
INCOME	0.1160	0.025	4.592	0.000	0.066	0.165	Prob(Omnibu	,		rque-Ber			
AGE	0.0254	0.005	4.936	0.000	0.015	0.036	Ske		6.139		b(JB):		0.00
AGE	0.0254	0.005	4.930	0.000	0.015	0.030	Kurtos	is: 5	7.139	Cor	id. No.		239.

3) Perform an ols regression and examine the relation between the number of bids and borrower characteristics such as credit, house, car, education, work time, etc.

The OLS result is shown on the right above. By observing the p-value of all the independent variables, we find that they are all 99% significant except for HOUSE. For HOUSE\_L and CAR\_L, since there's a loan on them, there may not be many investors to give money to them. For CREDIT, HOUSE, CAR, WORKTIME, INCOME, AGE, these characteristics describe the social status for certain person, thus if they're larger, it implies that there should be larger probability for them to give the money back, hence more BIDS for them. Nevertheless, the negative relation between BIDS and EDUCATION is quite elaborate. We may need further research to figure out the abnormal phenomenon.

			model	lifelines	.CoxPHFitter							
		durat	ion col		'deltatime'							
		ev	ent col		'Collapse'							
	baseline estimation		mation		breslow		Concordance			0.62		
	number	of observ	vations	774			Partial AIC	8658.98				
nur	number of events observed		served		774	Partial AIC			00.	30.30		
	partial log-likelihood			-4321.49	log-likelihood ratio test		114.14 on 8 df					
	time fit was run		2023-09-27 1	C-25-06 LITO	log2(p)	of II ratio toet			67.34			
		ume m v	vas run	2023-09-27	6.25.06 UTC	-logz(p)	of II-ratio test		,	07.34		
	coef						exp(coef) upper 95%	cmp to	z		-log2(p)	
RegCap		exp(coef)						cmp to			-log2(p)	
RegCap Joina:	pital 0.00	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%		z	р		
	pital 0.00	exp(coef) 1.00 0.56	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95% 1.00	0.00	z 0.03	p 0.98	0.03	
Joina	pital 0.00 asso -0.59 obid -0.24	exp(coef) 1.00 0.56	se(coef) 0.00 0.22	coef lower 95% -0.00 -1.03	coef upper 95% 0.00 -0.15	exp(coef) lower 95% 1.00 0.36	exp(coef) upper 95% 1.00 0.86	0.00	0.03 -2.62	p 0.98 0.01	0.03 6.81	
Joina: Auto Capitaldepo	pital 0.00 asso -0.59 obid -0.24	exp(coef) 1.00 0.56 0.79 0.49	se(coef) 0.00 0.22 0.09	coef lower 95% -0.00 -1.03 -0.41	0.00 -0.15 -0.06	exp(coef) lower 95% 1.00 0.36 0.66	exp(coef) upper 95% 1.00 0.86 0.94	0.00 0.00 0.00 0.00	0.03 -2.62 -2.61	p 0.98 0.01 0.01	0.03 6.81 6.80	
Joina: Auto Capitaldepo Obtaininy	pital 0.00 asso -0.59 obid -0.24 posit -0.71	exp(coef) 1.00 0.56 0.79 0.49 0.71	se(coef) 0.00 0.22 0.09 0.14	coef lower 95% -0.00 -1.03 -0.41 -0.99	coef upper 95% 0.00 -0.15 -0.06 -0.44	exp(coef) lower 95% 1.00 0.36 0.66 0.37	exp(coef) upper 95% 1.00 0.86 0.94 0.65	0.00 0.00 0.00 0.00 0.00	2 0.03 -2.62 -2.61 -5.05	p 0.98 0.01 0.01 <0.005 0.20	0.03 6.81 6.80 21.07	
Joina: Auto Capitaldepo Obtaininy Transri	pital 0.00 asso -0.59 bbid -0.24 bosit -0.71 vest -0.35	exp(coef) 1.00 0.56 0.79 0.49 0.71	se(coef) 0.00 0.22 0.09 0.14 0.27	-0.00 -1.03 -0.41 -0.99 -0.88	coef upper 95% 0.00 -0.15 -0.06 -0.44 0.19	exp(coef) lower 95% 1.00 0.36 0.66 0.37 0.42	exp(coef) upper 95% 1.00 0.86 0.94 0.65 1.21	0.00 0.00 0.00 0.00 0.00 0.00	2 0.03 -2.62 -2.61 -5.05 -1.27	p 0.98 0.01 0.01 <0.005 0.20	0.03 6.81 6.80 21.07 2.29	

4) Perform the Cox model (Proportional hazards model) and examine the relation between the platform default (survival) likelihood and platform characteristics such as RegCapital, Joinasso, etc.

RegCapital has slight effect on the likelihood of collapse, the rest of the variables except Riskdeposit and Thirdguarantee have negative relationship with the likelihood of collapse, and the exp(coef) are all smaller than 0.8, indicating that there's a significant impact. For Riskdeposit and Thirdguarantee, they have little impact on the likelihood. The concordance value is 0.62, indicating the model's ability to distinguish between different survival times. The p-value for the log-likelihood ratio test is very close to zero, reflecting the strong statistical significance of the model.

Below is the appendix for the code:

# FIN3210 Week 2 Assignment

#### Ma Kexuan 120090651

September 28, 2023

```
[1]: import pandas as pd
import numpy as np
import warnings
warnings.filterwarnings('ignore')
import statsmodels.api as sm
from lifelines import CoxPHFitter
```

#### 0.0.1 Read the data from the disk

```
[3]: rrd_tot.drop(['IND','CITY','PURPOSE','MARRY','title','description','nickName'], axis = 1, inplace = True)
rrd_tot.head()
```

[3]:	loanId	STATUS	BIDS	DEFAULT	AMOUNT	INTEREST	MONTHS	CREDIT	HOUSE	\
0	2	CLOSED	9	0	3000	5.0	6	7	1	
1	11	CLOSED	8	0	3000	18.0	3	3	0	
2	16	CLOSED	8	0	3000	12.0	12	3	0	
3	19	CLOSED	11	0	3000	8.8	12	7	1	
4	20	CLOSED	15	0	5000	15.0	12	7	0	

	CAR	HOUSE_L	CAR_L	EDUCATION	WORKTIME	INCOME	AGE		opentime	\
0	1	1	1	3.0	2.0	6.0	33	2010-10-12	17:17:01	
1	0	0	0	3.0	4.0	4.0	37	2010-10-18	16:40:38	
2	0	0	0	3.0	4.0	4.0	37	2010-10-21	17:26:58	
3	1	1	1	3.0	2.0	6.0	33	2010-10-25	17:19:39	
4	1	0	0	3.0	2.0	3.0	33	2010-10-26	14:29:03	

#### readytime

<sup>0 2010-10-15 11:00:49</sup> 

<sup>1 2010-10-21 17:07:41</sup> 

<sup>2 2010-10-28 14:35:07</sup> 

<sup>3 2010-10-28 20:58:15</sup> 

<sup>4 2010-10-28 14:34:33</sup> 

```
[4]: plat_tot.drop(['fullname', 'Province', 'City', 'Background'], axis = 1, inplace =
      →True)
     plat_tot.head()
[4]:
        OnlineTime YMD Bankrupt WDZJ
                                         Collapse
                                                   Benign Fraud RegCapital \
              20140519
                            20170413.0
                                                       0.0
                                                                         500.0
                                                              0.0
     1
              20151231
                            20170201.0
                                                 1
                                                       0.0
                                                              0.0
                                                                         500.0
                                                 1
                                                       0.0
                                                              0.0
     2
              20150504
                            20161201.0
                                                                         500.0
     3
              20180310
                            20180615.0
                                                 1
                                                       0.0
                                                              0.0
                                                                         500.0
     4
              20180320
                            20180724.0
                                                 1
                                                       0.0
                                                              1.0
                                                                           5.0
        Capitaldeposit
                         Obtaininvest
                                        Joinasso Autobid
                                                            Transright
                                                                         Riskdeposit
     0
                                   0.0
                                             1.0
                                                                                  0.0
                      0
                                                         0
                                                                                  0.0
     1
                                   0.0
                                             0.0
                                                                      0
     2
                      0
                                   0.0
                                             0.0
                                                         1
                                                                      1
                                                                                  0.0
                                                         0
                                                                      0
                                                                                  0.0
     3
                      0
                                   0.0
                                             0.0
     4
                      0
                                   0.0
                                             0.0
                                                         0
                                                                      0
                                                                                  0.0
        Thirdguarantee
     0
                    0.0
                    0.0
     1
     2
                    0.0
     3
                    0.0
                    0.0
```

# 0.0.2 1) Present two tables for the summary statistics of the key variables in Renrendai loans.xlsx and p2p lending platforms.xlsx

Procedures: Data cleaning, preserve the relevant data.

[5]:		count	mean	std	min	25%	50%	\
	BIDS	10000.0	24.150600	41.342608	1.0	9.0	15.0	
	DEFAULT	10000.0	0.151300	0.358359	0.0	0.0	0.0	
	AMOUNT	10000.0	24545.835000	38280.756524	3000.0	8000.0	14400.0	
	INTEREST	10000.0	12.621900	2.273689	5.0	11.0	12.0	
	MONTHS	10000.0	12.237300	8.091090	3.0	6.0	12.0	
	CREDIT	10000.0	2.146300	1.530990	1.0	1.0	2.0	
	HOUSE	10000.0	0.564500	0.495847	0.0	0.0	1.0	
	CAR	10000.0	0.391700	0.488155	0.0	0.0	0.0	
	HOUSE_L	10000.0	0.228400	0.419823	0.0	0.0	0.0	
	CAR_L	10000.0	0.082200	0.274683	0.0	0.0	0.0	
	EDUCATION	9996.0	2.165966	0.818108	1.0	2.0	2.0	
	WORKTIME	9994.0	2.838003	0.992755	1.0	2.0	3.0	

```
9998.0
                                                          1.0
                                                                  3.0
                                                                            4.0
     INCOME
                              4.309162
                                             1.335842
     AGE
                                                         24.0
                                                                 30.0
                                                                           33.0
                10000.0
                             34.755500
                                            6.682708
                    75%
                               max
     BIDS
                   24.0
                             592.0
     DEFAULT
                    0.0
                               1.0
     AMOUNT
                26000.0
                         500000.0
     INTEREST
                   13.0
                              24.4
                   12.0
                              36.0
     MONTHS
     CREDIT
                    3.0
                               7.0
     HOUSE
                    1.0
                               1.0
     CAR
                    1.0
                               1.0
     HOUSE_L
                    0.0
                               1.0
     CAR L
                    0.0
                               1.0
                    3.0
                               4.0
     EDUCATION
     WORKTIME
                    4.0
                               4.0
     INCOME
                    5.0
                               7.0
     AGE
                   38.0
                              53.0
[6]: plat = plat_tot[['OnlineTime_YMD', 'Bankrupt_WDZJ', 'Collapse', 'Benign',
                       'Fraud', 'RegCapital', 'Capitaldeposit', 'Obtaininvest',
                      П
      →'Joinasso','Autobid','Transright','Riskdeposit','Thirdguarantee']]
     plat_des = plat.drop(['OnlineTime_YMD', 'Bankrupt_WDZJ'], axis = 1)
     plat_des.describe().T
[6]:
                                                   std min
                                                               25%
                                                                       50%
                                                                              75% \
                       count
                                    mean
                                                               1.0
     Collapse
                      1000.0
                                0.782000
                                             0.413094 0.0
                                                                       1.0
                                                                              1.0
     Benign
                      782.0
                                0.098465
                                             0.298134 0.0
                                                               0.0
                                                                       0.0
                                                                              0.0
     Fraud
                                                               0.0
                                                                       0.0
                                                                              0.0
                       782.0
                                0.246803
                                             0.431427 0.0
     RegCapital
                      1000.0
                             596.064330
                                          2328.221711
                                                        2.0
                                                             100.0
                                                                    300.0
                                                                            500.0
     Capitaldeposit
                     1000.0
                                             0.393286 0.0
                                                               0.0
                                                                       0.0
                                                                              0.0
                                0.191000
     Obtaininvest
                      968.0
                                0.026860
                                             0.161756 0.0
                                                               0.0
                                                                       0.0
                                                                              0.0
     Joinasso
                       968.0
                                0.054752
                                             0.227613 0.0
                                                               0.0
                                                                       0.0
                                                                              0.0
                                                               0.0
                                                                       0.0
                                                                              0.0
     Autobid
                      1000.0
                                0.244000
                                             0.429708 0.0
                                                                              0.0
                      1000.0
                                0.177000
                                             0.381860 0.0
                                                               0.0
                                                                       0.0
     Transright
                                                                              0.0
     Riskdeposit
                       968.0
                                0.021694
                                              0.145758 0.0
                                                               0.0
                                                                       0.0
     Thirdguarantee
                      968.0
                                0.034091
                                             0.181557 0.0
                                                               0.0
                                                                       0.0
                                                                              0.0
                          max
     Collapse
                          1.0
     Benign
                          1.0
     Fraud
                          1.0
                     50000.0
     RegCapital
     Capitaldeposit
                          1.0
     Obtaininvest
                          1.0
     Joinasso
                          1.0
```

Autobid	1.0
Transright	1.0
Riskdeposit	1.0
Thirdguarantee	1.0

0.0.3 2) Perform a logit regression and examine the relation between the default likelihood and borrower characteristics such as credit, house, car, education, work time, etc.

Optimization terminated successfully.

Current function value: 0.330132

Iterations 9

[7]: <class 'statsmodels.iolib.summary.Summary'>

Logit Regression Results

Dep. Variab	ole:	DEFA		Observations	:	9990
Model:		Lo	git Df Re	esiduals:		9980
Method:			MLE Df Mo	odel:		9
Date:	T	hu, 28 Sep 2	.023 Pseud	do R-squ.:		0.2236
Time:		21:02	2:46 Log-I	Likelihood:		-3298.0
converged:		Т	rue LL-Nu	ıll:		-4247.9
Covariance	Type:	nonrob	oust LLR p	o-value:		0.000
========	coef		z	P> z	[0.025	0.975]
const	0.5155		2.427		0.099	0.932
CREDIT	-1.8927	0.082	-23.044	0.000	-2.054	-1.732
HOUSE	0.1438	0.073	1.968	0.049	0.001	0.287
CAR	-0.4586	0.080	-5.708	0.000	-0.616	-0.301
HOUSE_L	-0.3307	0.091	-3.633	0.000	-0.509	-0.152
CAR_L	0.1620	0.134	1.207	0.228	-0.101	0.425
EDUCATION	-0.4156	0.040	-10.426	0.000	-0.494	-0.337
WORKTIME	0.0090	0.034	0.264	0.792	-0.058	0.076
INCOME	0.1160	0.025	4.592	0.000	0.066	0.165
AGE	0.0254	0.005	4.936	0.000	0.015	0.036

11 11 11

0.0.4 3) Perform an ols regression and examine the relation between the number of bids and borrower characteristics such as credit, house, car, education, work time, etc.

[8]: <class 'statsmodels.iolib.summary.Summary'>

#### OLS Regression Results

=============			
Dep. Variable:	BIDS	R-squared:	0.173
Model:	OLS	Adj. R-squared:	0.172
Method:	Least Squares	F-statistic:	232.1
Date:	Thu, 28 Sep 2023	Prob (F-statistic):	0.00
Time:	21:02:46	Log-Likelihood:	-50383.
No. Observations:	9990	AIC:	1.008e+05
Df Residuals:	9980	BIC:	1.009e+05
Df Model:	9		

Covariance Type: nonrobust

========	========	========	========	.=======	========	=======
	coef	std err	t	P> t	[0.025	0.975]
const	-50.8110	2.479	-20.497	0.000	-55.670	-45.952
CREDIT	1.8652	0.257	7.248	0.000	1.361	2.370
HOUSE	1.6099	0.926	1.738	0.082	-0.206	3.426
CAR	4.2582	0.918	4.637	0.000	2.458	6.059
HOUSE_L	-7.1289	1.030	-6.924	0.000	-9.147	-5.111
CAR_L	-7.1951	1.482	-4.854	0.000	-10.101	-4.290
EDUCATION	-2.0042	0.475	-4.218	0.000	-2.936	-1.073
WORKTIME	2.4355	0.426	5.721	0.000	1.601	3.270
INCOME	9.2260	0.308	29.918	0.000	8.622	9.831
AGE	0.8126	0.066	12.235	0.000	0.682	0.943
Omnibus:		11602.	======================================	 n-Watson:		1.743
Prob(Omnibu	s):	0.	000 Jarque	e-Bera (JB):	1	282780.294
Skew:		6.	139 Prob(3	IB):		0.00
Kurtosis:		57. 	139 Cond.	No.		239.

#### Notes:

[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

11 11 11

0.0.5 4) Perform the Cox model (Proportional hazards model) and examine the relation between the platform default (survival) likelihood and platform characteristics such as RegCapital, Joinasso, etc.

```
[9]: cox_dt = plat[['OnlineTime_YMD', 'Bankrupt_WDZJ', 'Collapse',
                       'RegCapital', 'Joinasso', 'Autobid',
                       'Capitaldeposit', 'Obtaininvest',
                       'Transright', 'Riskdeposit', 'Thirdguarantee']]
     cox_dt.dropna(inplace=True) # Drop the missing values
     cox_dt['OnlineTime_YMD'] = pd.to_datetime(cox_dt['OnlineTime_YMD'],__

¬format='%Y%m%d')
     cox dt['Bankrupt WDZJ'] = pd.to datetime(cox dt['Bankrupt WDZJ'],
       ⇒format='%Y%m%d') # Transfer the data into datetime variables
     cox_dt['deltatime'] = (cox_dt['Bankrupt_WDZJ'] - cox_dt['OnlineTime_YMD']).dt.
       →days # Calculate the days difference between the 2 dates
     cox dt.drop(['OnlineTime YMD', 'Bankrupt WDZJ'], axis=1, inplace=True)
     cph = CoxPHFitter()
     cph.fit(cox dt, duration col = 'deltatime', event col = 'Collapse')
     cph.print_summary()
                             \exp(\operatorname{coef})
                                         se(coef)
                                                  coef lower 95%
                                                                   coef upper 95%
                                                                                    exp(coef) lower 95%
                        coef
      covariate
      RegCapital
                                   1.00
                                            0.00
                                                            -0.00
                                                                              0.00
                       0.00
                                                                                                    1.00
      Joinasso
                       -0.59
                                  0.56
                                            0.22
                                                            -1.03
                                                                             -0.15
                                                                                                   0.36
      Autobid
                       -0.24
                                  0.79
                                            0.09
                                                            -0.41
                                                                             -0.06
                                                                                                   0.66
      Capitaldeposit
                       -0.71
                                  0.49
                                            0.14
                                                            -0.99
                                                                             -0.44
                                                                                                   0.37
      Obtaininvest
                       -0.35
                                  0.71
                                            0.27
                                                            -0.88
                                                                              0.19
                                                                                                   0.42
      Transright
                       -0.37
                                                                                                   0.56
                                  0.69
                                            0.11
                                                            -0.59
                                                                             -0.16
      Riskdeposit
                       -0.14
                                  0.87
                                            0.27
                                                            -0.67
                                                                              0.38
                                                                                                   0.51
      Thirdguarantee
                       -0.06
                                  0.94
                                            0.23
                                                                              0.39
                                                            -0.51
                                                                                                   0.60
                       \exp(\text{coef}) \text{ upper } 95\%
                                             cmp to
                                                                   -\log 2(p)
      covariate
      RegCapital
                                       1.00
                                               0.00
                                                      0.03
                                                            0.98
                                                                       0.03
      Joinasso
                                       0.86
                                               0.00
                                                     -2.62
                                                            0.01
                                                                       6.81
      Autobid
                                       0.94
                                               0.00
                                                     -2.61
                                                            0.01
                                                                       6.80
      Capitaldeposit
                                       0.65
                                               0.00 -5.05
                                                            0.00
                                                                      21.07
      Obtaininvest
                                                     -1.27
                                                                       2.29
                                       1.21
                                               0.00
                                                            0.20
      Transright
                                                     -3.37
                                       0.86
                                               0.00
                                                             0.00
                                                                      10.40
      Riskdeposit
                                       1.46
                                               0.00
                                                     -0.54
                                                            0.59
                                                                       0.76
      Thirdguarantee
                                       1.47
                                               0.00
                                                     -0.28
                                                            0.78
                                                                       0.36
```