Problem Set 5

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Economic Questions

Many fund managers claim that Collateralized Loan Obligations (CLO) provides them higher returns. I want to test whether this claim is true.

Data description

I download issuers' bond transactions from xxx to 2018 because insurers are required to report their purchase and sales at the individual security level quarterly. For each trade, they disclose the trade size, price paid/received, date traded, and type of bond. I calculate holding period return for each bond transaction following first-in, first-out method. For example, if Allstate Insurance CO. bought $800 face value of a bond on January 31st, sold $200 on April 20th, bought $100 on October 16th, and sold $700 on December 16th in 2018. Following my method, the $200 on April 20th and $600 of the $700 on December 16th comes from $800 of principal bought on January 31st. The $100 of principal remaining on December 16th comes from $100 on October 16th. Holding period (HP) is the time period between purchase date and disposal date. Holding period return (HPR) is the total return received from holding a bond.

$$HPR_{i,j} = (P_{1i,j} + I_{1i,j} - P_{0i,j} - I_{0i,j})/((P_{0i,j} + I_{0i,j})) \tag{1}$$

where $P_{1i,j}$ and $I_{1i,j}$ are the price received and coupon received during holding period of firm j's trade i and $P_{0i,j}$ and $I_{0i,j}$ are the price paid and interest paid at purchase date of firm j's trade i.

I choose corporate bond as a benchmark and apply Fama-French five factor model to get excess return of each bond trade.

The stata file contains log of holding period return (lnhpr), indicator of type of bond (CLO). CLO is 1 if bond is CLO or 0 if bond is corporate bond, Fama-French five factors(market excess return(mkt), small minus big(smb), high minus low(hml), default premium(def), term premium(term)), and holding period (HP). If fund managers' claim is true, CLO should have higher excess return than corporate bonds.

Part A

Firstly, I draw the distribution of log of holing period return, shown in figure 1. The distribution of log of holing period return is like a normal distribution.

Then, I draw a bar plot to show the average of log of holding period return of corporate bond and CLO, shown in figure 2. CLO has higher average holding period return than corporate bond.
Lastly, I draw a scatter plot to show the log of holding period return of corporate bond and CLO, shown in figure 3. CLO has higher holding period return than corporate bond.

Part B

Firstly, I did an OLS regression without fixed effect on panel data. The regression model is:

$$ln(hpr) = \alpha + \beta CLO + \gamma_1 MKT + \gamma_2 SMB + \gamma_3 hml + \gamma_4 term + \gamma_5 def + \gamma_6 hp \tag{2}$$

The results is shown in figure 4. The results for β is 1.9056. CLO has 1.9056% extra holding period return than corporate bond keeping other variables constant. Then, I did an OLS regression with firm fixed effect on panel data. The regression model is:

$$ln(hpr) = \alpha + \sigma_f irm + \beta CLO + \gamma_1 MKT + \gamma_2 SMB + \gamma_3 hml + \gamma_4 term + \gamma_5 def + \gamma_6 hp \tag{3}$$

The results is shown in figure 5. The results for β is 1.6441, which is similar to result without fixed effect. CLO has 1.6441% extra holding period return than corporate bond keeping other variables constant.

Figure 1: Distribution of holding period return

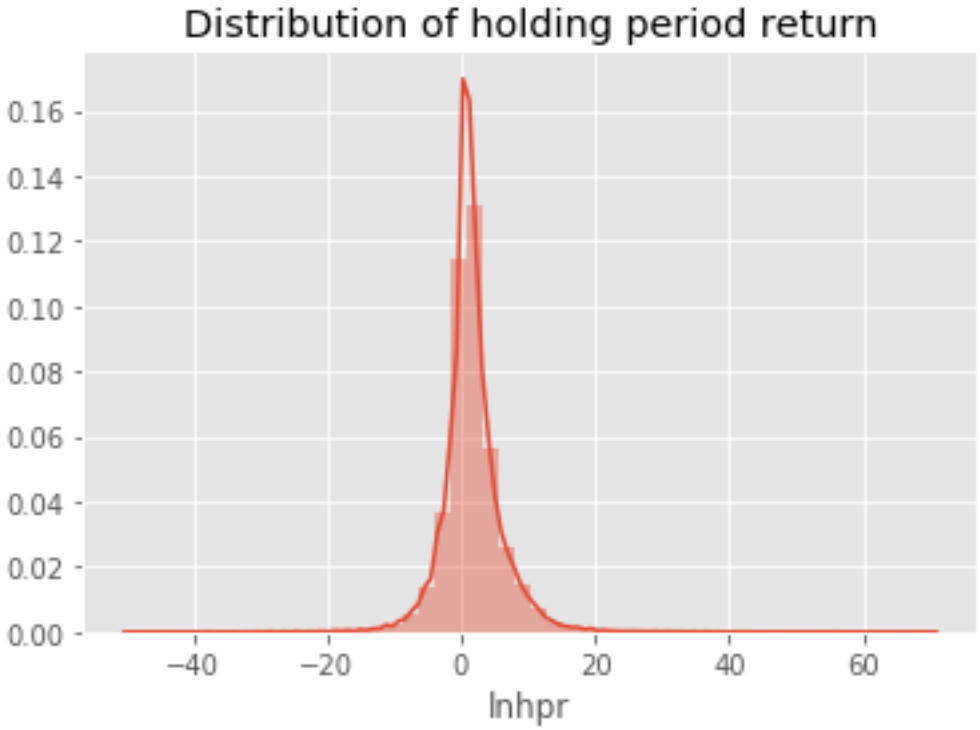
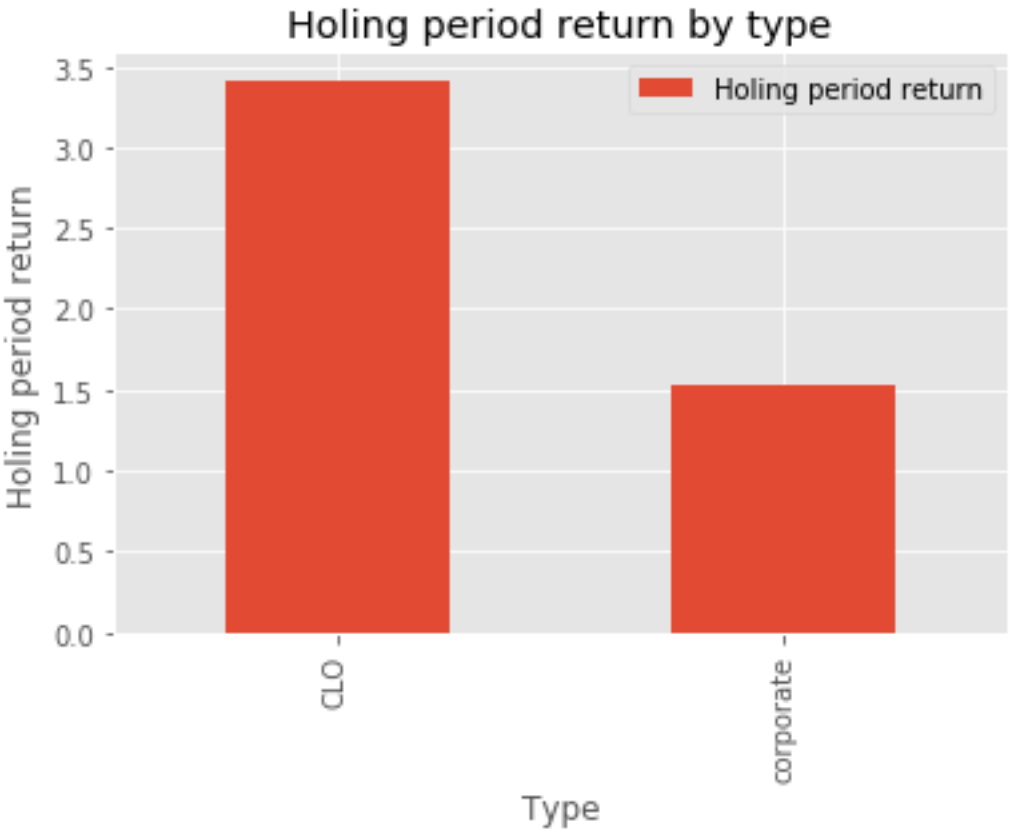
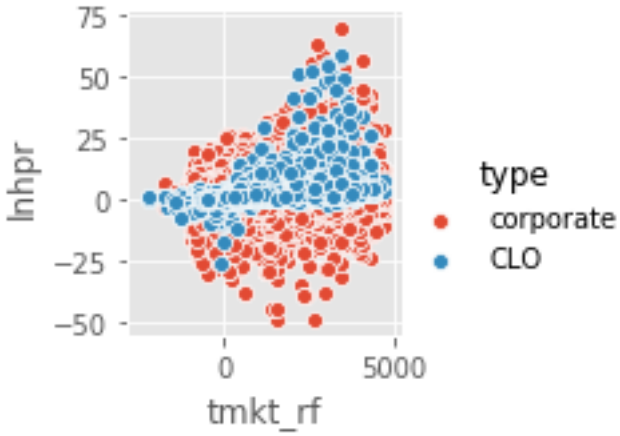


Figure 2: Average holding period return by type



plot.png

Figure 3: Holding period return by type



plot.png

Figure 4: OLS without fixed effect

	coef	std err	t	P>|t|	[0.025	0.975]
Intercept	1.4348	0.024	61.029	0.000	1.389	1.481
clo	1.9056	0.062	30.594	0.000	1.784	2.028
tmkt_rf	0.0018	3.08e-05	59.744	0.000	0.002	0.002
tsmb	-0.0004	3.87e-05	-10.165	0.000	-0.000	-0.000
thml	-9.733e-05	2.49e-05	-3.905	0.000	-0.000	-4.85e-05
tterm	-0.0014	6.61e-05	-20.602	0.000	-0.001	-0.001
tdef	0.0083	0.000	61.873	0.000	0.008	0.009
hp	-8.6064	0.135	-63.978	0.000	-8.870	-8.343

Omnibus:	33927.594	Durbin-Watson:	1.485
Prob(Omnibus):	0.000	Jarque-Bera (JB):	811203.504
Skew:	1.066	Prob(JB):	0.00
Kurtosis:	16.698	Cond. No.	3.48e+04

Figure 5: OLS with firm fixed effect

Parameter Estimates

	Parameter	Std. Err.	T-stat	P-value	Lower CI	Upper CI
const	1.3086	0.0240	54.540	0.0000	1.2616	1.3556
clo	1.6441	0.0680	24.172	0.0000	1.5108	1.7775
tmkt_rf	0.0018	3.067e-05	58.568	0.0000	0.0017	0.0019
tsmb	-0.0003	3.884e-05	-8.3718	0.0000	-0.0004	-0.0002
thml	-6.27e-05	2.492e-05	-2.5154	0.0119	-0.0001	-1.384e-05
tterm	-0.0013	6.678e-05	-19.934	0.0000	-0.0015	-0.0012
tdef	0.0083	0.0001	61.870	0.0000	0.0080	0.0086
hp	-8.4802	0.1348	-62.893	0.0000	-8.7445	-8.2159