# Research lab assignment 3

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Group 9

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QUESTION 1:

a.

CAPM estimation

```
. esttab, se(%9.3f) b(%9.3f) r2 mti(AMZN KKD NOC)
```

| | (1) AMZN | (2) KKD | (3) NOC |
|---|---|---|---|
| m_excess_r | 1.550*** | 1.365** | 0.645*** |
| | (0.215) | (0.423) | (0.137) |
| _cons | 0.021** | 0.010 | 0.009* |
| | (0.007) | (0.013) | (0.004) |
| N | 228 | 186 | 228 |
| R-sq | 0.269 | 0.097 | 0.207 |

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

**The riskiest stock:** AMZN (highest beta)

**The safest stock:** NOC (lowest beta)

With a significance level of 5 percent, all three stocks pay an abnormal return, as indicated by the significant positive constants. However, with a significance level of 1 percent, only AMZN and NOC show significant abnormal returns.

Expected abnormal return in a year

AMZN: Monthly return of AMZN * 12 months = 0.021 * 12 = 0.252

KKD: Monthly return of KKD * 12 months = 0.01 * 12 = 0.012

NOC: Monthly return of NOC = 0.009*12 = 0.108

b.

```
. test _cons

 ( 1)  [c_excess_r]_cons = 0

           chi2(  1) =    7.65
         Prob > chi2 =    0.0057
```

Given the p-value of 0.0057 and a significance level of 1%, we reject the null hypothesis which states that the abnormal returns of AMZN, KKD and NOC are jointly equal to zero.Therefore, we can not conclude that the market is efficient.

c.

When it comes to AMZN, the alpha stayed the same at 0.021. The beta of AMZN has decreased from 1.550 to 1.546. For the KKD, alpha has decreased from 0.01 to 0.006, and the beta declined from 1.365 to 1.113. In case of NOC, alpha has stayed the same at 0.009 and the beta has decreased from 0.645 to 0.632.

```
. esttab, p(%9.3f) b(%9.3f) r2 mti(AMZN AMZN KKD KKD NOC NOC)
(tabulating estimates stored by eststo; specify "." to tabulate the active results)
```

| | (1) AMZN | (2) AMZN | (3) KKD | (4) KKD | (5) NOC | (6) NOC |
|---|---|---|---|---|---|---|
| m_excess_r | 1.550*** | 1.546*** | 1.365** | 1.113** | 0.645*** | 0.632*** |
| | (0.000) | (0.000) | (0.001) | (0.002) | (0.000) | (0.000) |
| smb | | 0.242 | | 1.349* | | 0.007 |
| | | (0.457) | | (0.021) | | (0.971) |
| hml | | -1.410*** | | 0.592 | | 0.406* |
| | | (0.000) | | (0.333) | | (0.031) |
| _cons | 0.021** | 0.021** | 0.010 | 0.006 | 0.009** | 0.009* |
| | (0.005) | (0.002) | (0.436) | (0.629) | (0.010) | (0.018) |
| N | 228 | 228 | 186 | 186 | 228 | 228 |
| R-sq | 0.269 | 0.362 | 0.097 | 0.132 | 0.207 | 0.241 |

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Joint inclusion is significant at 5%, so we should add *smb* and *hml* to the model.

```
. test smb hml

 ( 1)  [c_excess_r]smb = 0
 ( 2)  [c_excess_r]hml = 0

           chi2(  2) =    6.49
         Prob > chi2 =    0.0390
```

d.

The stocks respond less when SMB and HML are added. When historic excess returns are considered, investors tend to respond less to the excess returns of stocks.

QUESTION 2:

a.

```
g estwindow = date>=mdy(5,4,2009) & date<=mdy(4,29,2010)
```

b.

```
gen fininst=1 if siccd>6000 &  siccd<6500
replace fininst=0 if fininst==.

gen bank=1 if siccd>6000 & siccd<6100
replace bank=0 if bank==.

gen credit=1 if siccd>6100 & siccd<6200
replace credit=0 if credit==.
```

c.

```
bysort permno (date): gen lret = log(prc) - log(prc[_n-1])
drop if lret==.
```

d.

The mean of alphas: .0000311

The standard deviation of alphas:  .0014162

The mean of betas:  .9700105

The standard deviation of betas:  .6547095

```
gen lmkt= log(mktrf+1)
bys permno: asreg lret lmkt
bys permno: egen beta = max(_b_lmkt)
bys permno: egen alpha = max(_b_cons)
```

drop _Nobs-_b_cons

sum beta

sum alpha

e.

gen eventwin = date>=mdy(4,29,2010) & date<=mdy(5,26,2010)

gen AR = lret - alpha - beta*mktrf if eventwin==1

bys permno (date): g CAR = sum(AR*eventwin)

f.

```
. *average CAR
. reg CAR1 if eventwin2 ==1,r

Linear regression                               Number of obs     =     99,008
                                                F(0, 99007)       =       0.00
                                                Prob > F          =          .
                                                R-squared         =     0.0000
                                                Root MSE          =     .05044

------------------------------------------------------------------------------
             |               Robust
        CAR1 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       _cons |  -.0005441   .0001603    -3.39   0.001    -.0008583   -.0002299
------------------------------------------------------------------------------
```

```
. reg CAR1 weight if eventwin2 ==1, r

Linear regression                               Number of obs     =     99,008
                                                F(0, 99006)       =          .
                                                Prob > F          =          .
                                                R-squared         =     0.0000
                                                Root MSE          =     .05044
```

| CAR1 | Coef. | Robust Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| weight | 5.84e-12 | 6.08e-12 | 0.96 | 0.337 | -6.07e-12 | 1.77e-11 |
| _cons | -.0005598 | .0001672 | -3.35 | 0.001 | -.0008875 | -.000232 |

The average CAR is negative (-0.0005441) with the significant p-value (0.001). From the second regression, it can be seen that the sensitivity of the event with respect to market capitalization on July 21st, 2010 (weight) is not significant.

g.

```
. reg CAR1 fininst [aw=weight], r
(sum of wgt is 6580514306289.611)

Linear regression                               Number of obs     =  2,451,904
                                                F(1, 2451902)     =    206.87
                                                Prob > F          =    0.0000
                                                R-squared         =    0.0023
                                                Root MSE          =     .0052
```

| CAR1 | Coef. | Robust Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| fininst | .0007369 | .0000512 | 14.38 | 0.000 | .0006365 | .0008373 |
| _cons | -.0001082 | .0000108 | -10.03 | 0.000 | -.0001293 | -.000087 |

```
. reg CAR1 bank [aw=weight], r
(sum of wgt is 6580514306289.611)

Linear regression                               Number of obs     =  2,451,904
                                                F(1, 2451902)     =     104.29
                                                Prob > F          =     0.0000
                                                R-squared         =     0.0020
                                                Root MSE          =      .0052

------------------------------------------------------------------------------
             |               Robust
        CAR1 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        bank |   .0009258   .0000907    10.21   0.000     .0007481    .0011035
       _cons |  -.0000733   .0000104    -7.04   0.000    -.0000937   -.0000529
------------------------------------------------------------------------------
```

```
. reg CAR1 credit [aw=weight], r
(sum of wgt is 6580514306289.611)

Linear regression                               Number of obs     =  2,451,904
                                                F(1, 2451902)     =      29.92
                                                Prob > F          =     0.0000
                                                R-squared         =     0.0001
                                                Root MSE          =     .00521

------------------------------------------------------------------------------
             |               Robust
        CAR1 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      credit |   .0004314   .0000789     5.47   0.000     .0002768     .000586
       _cons |  -.0000133   .0000116    -1.15   0.252    -.0000361    9.44e-06
------------------------------------------------------------------------------
```

The both depository and bank institutions win with the Dodd-Frank Act. From the second and third regressions, both coefficients are positive with the significant level. Still, the banks have a higher coefficient with a weighted-value portfolio CAR which means the banks get more benefit from the Dodd-Frank Act.

h.

```
. reg CAR2 fininst [aw=weight1] , r
(sum of wgt is 6602749935305.225)

Linear regression                               Number of obs     =  2,451,904
                                                F(1, 2451902)     =      12.93
                                                Prob > F          =     0.0003
                                                R-squared         =     0.0000
                                                Root MSE          =     .01845
```

| CAR2 | Coef. | Robust Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| fininst | .0002864 | .0000796 | 3.60 | 0.000 | .0001303 | .0004425 |
| _cons | -.0002055 | .0000342 | -6.01 | 0.000 | -.0002724 | -.0001385 |

```
. reg CAR2 bank [aw=weight1] , r
(sum of wgt is 6602749935305.225)

Linear regression                               Number of obs     =  2,451,904
                                                F(1, 2451902)     =      53.01
                                                Prob > F          =     0.0000
                                                R-squared         =     0.0001
                                                Root MSE          =     .01845
```

| CAR2 | Coef. | Robust Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| bank | .0008054 | .0001106 | 7.28 | 0.000 | .0005886 | .0010222 |
| _cons | -.0002228 | .0000325 | -6.86 | 0.000 | -.0002864 | -.0001591 |

```
. reg CAR2 credit [aw=weight1], r
(sum of wgt is 6602749935305.225)

Linear regression                               Number of obs     =  2,451,904
                                                F(1, 2451902)     =     36.86
                                                Prob > F          =    0.0000
                                                R-squared         =    0.0001
                                                Root MSE          =    .01845
```

| CAR2 | Coef. | Robust Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| credit | -.0024133 | .0003975 | -6.07 | 0.000 | -.0031924 | -.0016342 |
| _cons | -.0001475 | .0000312 | -4.73 | 0.000 | -.0002086 | -.0000864 |

The first regression which represents financial institutions before the event has a similar movement by having positive coefficient with the first regression from the question g. Therefore, it can be interpreted that the market was pricing the Dodd-Frank Act.

QUESTION 3:

a)

```
. reg invest post treat post_treat if inrange(fyear,2006,2009), cluster(gvkey)

Linear regression                               Number of obs     =      5,202
                                                F(3, 1626)        =      41.33
                                                Prob > F          =     0.0000
                                                R-squared         =     0.0150
                                                Root MSE          =     .45584

                                    (Std. Err. adjusted for 1,627 clusters in gvkey)
```

| invest | Coef. | Robust Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| post | -.1605454 | .0157525 | -10.19 | 0.000 | -.1914427 | -.1296481 |
| treat | -.0535374 | .0171434 | -3.12 | 0.002 | -.0871628 | -.019912 |
| post_treat | .0675305 | .0260934 | 2.59 | 0.010 | .0163503 | .1187107 |
| _cons | .3776597 | .0125447 | 30.11 | 0.000 | .3530541 | .4022652 |

b)

$\beta_0$, the intercept, indicates the average investment of non-treated groups pre-2008.

$\beta_1$ is the macro effect, it is the change in the average investment of non-treated groups going from pre- to post-2008.

$\beta_2$ shows the underlying difference; the difference between the average investment of the treated and non-treated groups pre-2008.

$\beta_3$, the interaction effect, is our coefficient of interest as it measures the difference-in-difference. This is the **difference** between the **changes** of the treated and non-treated group pre- to post-2008. (Or: the difference between the treated and non-treated group post-2008 minus the difference between the treated and non-treated group pre-2008.)

QUESTION 4:

| Variable | (a) | (b) | (c) | (d) |
|---|---|---|---|---|
| post_treat | 0.063 | 0.018 | 0.048 | 0.053 |
| | (3.13) | (1.19) | (2.26) | (2.57) |
| post | -0.089 | | | |
| | (-6.85) | | | |
| treat | -0.044 | | | |
| | (-2.76) | | | |
| Leverage L1. | | | | -0.041 |
| | | | | (-2.6) |
| Cfta L1. | | | | 0.015 |
| | | | | (0.64) |
| Year dummies | no | yes | yes | yes |
| Fixed effects | no | yes | yes | yes |

*t-stat in parentheses

a) When expanding the sample to a longer time period, the DiD, as shown by the interaction coefficient, decreases (from 0.067 percentage point in question 3 to 0.063 percentage point in question 4a). The t-stat however increases.

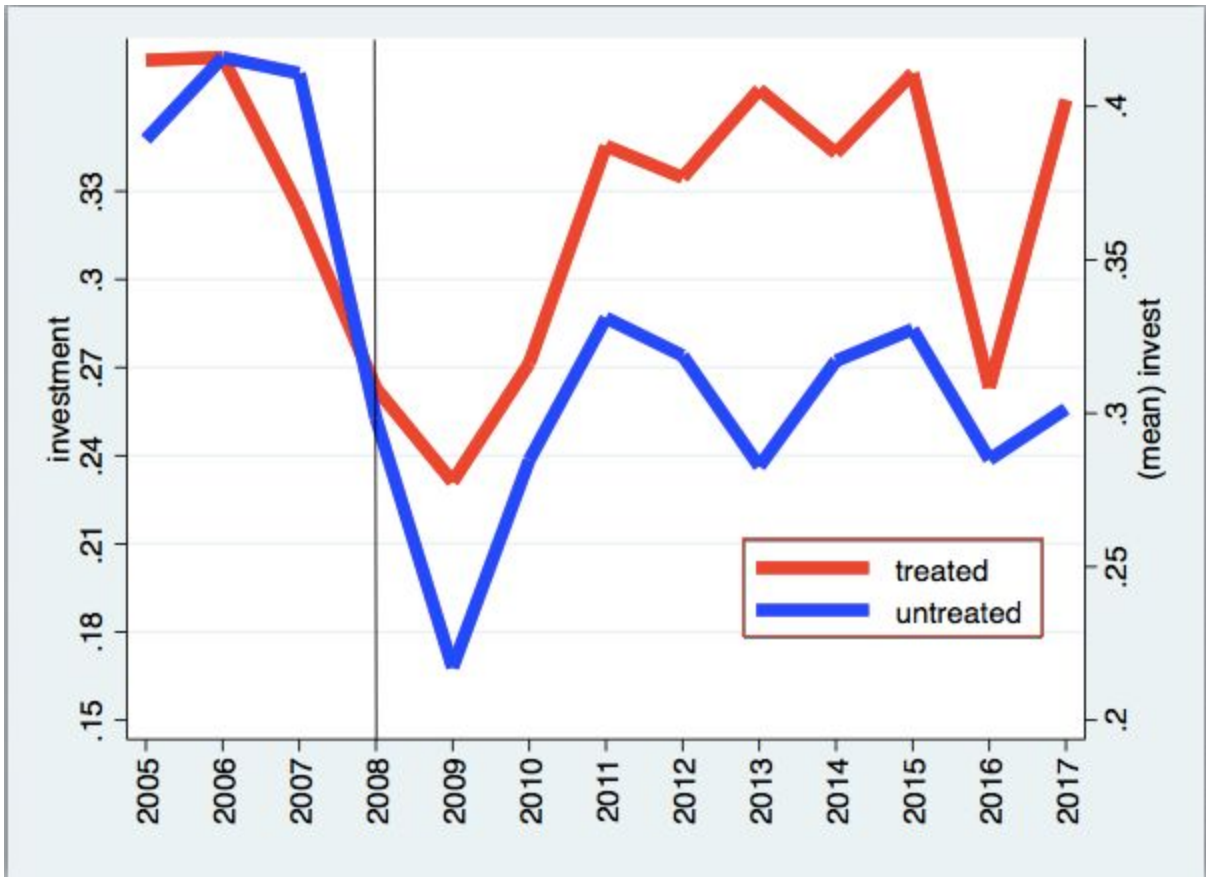
b) Inclusion of the year dummies and industry fixed effects results in a decrease of the DiD from 0.063 to 0.018. Furthermore, the estimate no longer is significant.

c) When controlling for the fixed effects at firm-level instead of at the industry-level, we see that the interaction effect has increased from 0.018 to 0.048. Additionally, the t-value has increased.

d) We encounter a slight increase in the interaction effect (0.048 to 0.053 percentage point). In addition, this estimate has become less noisy; as seen by the increased t-stat. Furthermore, we find a significant negative relationship of the lagged leverage on the investment. This possibly explains the increase in the interaction effect, as part of its negative bias in 4c is now controlled for by the lagged leverage.

QUESTION 5:

a. Perform a test for parallel trends. Be creative!




b.

The DiD model in question 3 is not valid since the parallel trend assumption, which is required to ensure the model's internal validity, does not hold. According to the parallel trend assumption the difference between the treatment and the control group needs to be constant in the absence of treatment - which is not the case as seen in the graph above.