```
cd "C:\Users\shiyq\Desktop\PreDoc\UPenn Predoc Data Analysis"
import delimited "C:\Users\shiyq\Desktop\PreDoc\UPenn Predoc Data Analysis\totalticliabs_hist.csv"
*******************************************************************************
*******************************************************************************
* 1. Data Manipulation
***************
***** 1.1 Data Cleaning
/* The first and last 5 rows were deleted in the original Excel file to make the dataset more concise, so now I am able to define the liability and holder types in Stata
*/
* Define liability types:
local liability_types "total_lia total_sec lt_sec lt_trea lt_oth_sec st_sec st_trea st_oth_sec all_oth_lia"
* Define holder types:
local holder_types "all offi priv"
local i = 2
* Loop to rename variables:
foreach holder in `holder_types' {
    foreach liability in `liability_types' {
        rename v`i' `holder'_`liability'
        local i = `i' + 1
    }
}
rename v1 month
drop in 1/8
* Now destring the dataset
foreach var of varlist all_total_lia-priv_all_oth_lia {
    destring `var', replace ignore(",")
}
* After destringed and kind of reshaped the dataset, the format of the month column also need to be changed as well
gen date_clean = monthly(month, "YM")
format date_clean %tm
drop month
rename date_clean month
* Moving the Month to the first column
order month, first
* Generate all numbers into Billions, better for plots and analysis
foreach var of varlist all_total_lia all_total_sec all_lt_sec all_lt_trea all_st_sec all_st_trea all_all_oth_lia offi_total_lia offi_total_sec offi_lt_sec offi_lt_trea offi_st_sec offi_st_trea offi_all_oth_lia priv_total_lia priv_total_sec priv_lt_sec priv_lt_trea priv_st_sec priv_st_trea priv_all_oth_lia {
    replace `var' = `var' / 1000
}
save "C:\Users\shiyq\Desktop\PreDoc\UPenn Predoc Data Analysis\Data_Task_Yuqi.dta"
* Labeling the variables
* Since I directly typed in the data editor mode, the code looks repetitive but I think it is faster in this way
label variable all_total_lia "Total liabilities (All foreign holders)"
label variable all_total_sec "Total securities (All foreign holders)"
label variable all_lt_sec "Long-term securities (All foreign holders)"
label variable all_lt_trea "Long-term Treasuries (All foreign holders)"
label variable all_lt_oth_sec "Other Long-term Securities (All foreign holders)"
label variable all_st_sec "Short-term securities (All foreign holders)"
label variable all_st_trea "Short-term Treasuries (All foreign holders)"
label variable all_st_oth_sec "Other Short-term securities (All foreign holders)"
label variable all_all_oth_lia "Other liabilities (All foreign holders)"
label variable offi_total_lia "Total liabilities (Official holders)"
label variable offi_total_sec "Total securities (Official holders)"
label variable offi_lt_sec "Long-term securities (Official holders)"
label variable offi_lt_trea "Long-term Treasuries (Official holders)"
label variable offi_lt_oth_sec "Other Long-term Securities (Official holders)"
label variable offi_st_sec "Short-term securities (Official holders)"
label variable offi_st_trea "Short-term Treasuries (Official holders)"
label variable offi_st_oth_sec "Other Short-term securities (Official holders)"
label variable offi_all_oth_lia "Other liabilities (Official holders)"
label variable priv_total_lia "Total liabilities (Private holders)"
label variable priv_total_sec "Total securities (Private holders)"
```

```
label variable priv_lt_sec "Long-term securities (Private holders)"
label variable priv_lt_trea "Long-term Treasuries (Private holders)"
label variable priv_lt_oth_sec "Other Long-term securities (Private holders)"
label variable priv_st_sec "Short-term securities (Private holders)"
label variable priv_st_trea "Short-term Treasuries (Private holders)"
label variable priv_st_oth_sec "Other Short-term securities (Private holders)"
label variable priv_all_oth_lia "Other liabilities (Private holders)"
*******************************************************************************
*******************************************************************************
***** 1.2 Exploratory Analysis & Visualization
* Firstly generate the summary table for All foreign holders
sum2docx all_total_lia all_total_sec all_lt_sec all_lt_trea all_st_sec all_st_trea all_all_oth_lia
 using summary_all.docx, replace stats (N mean sd min median max) title("Summary table 1: All
foreign holders")
* One more table for both the Official and Private holders so we could see the comparison
sum2docx offi_total_lia priv_total_lia offi_total_sec priv_total_sec offi_lt_sec priv_lt_sec
offi_lt_trea priv_lt_trea offi_st_sec priv_st_sec offi_st_trea priv_st_trea offi_all_oth_lia
priv_all_oth_lia using summary_offi_priv.docx, replace stats (N mean sd min median max) title(
"Summary table 2: Official holders v Private holders")
*******************************************************************************
* Set the time format for Month
tsset month
* The Graph of Liabilities Comparison by Holder type
twoway (line all_total_lia month, lcolor(blue)) (line offi_total_lia month, lcolor(red)) (line
priv_total_lia month, lcolor(green)), title("Comparison of Liabilities by Holder Type") xtitle(
"Time (Months)") ytitle("Liabilities (Billions)") legend(order(1 "All foreign holders" 2
"Official holders" 3 "Private holders"))
graph export "C:\Users\shiyq\Desktop\PreDoc\UPenn Predoc Data Analysis\Comparison of Liabilities
by Holder Type.png", as(png) name("Graph")
*******************************************************************************
* To check the trends of each liability type, get the subplots of each type
twoway line all_total_sec month, lcolor(blue) lwidth(medium) title("Total Securities") name(plot1,
 replace) ylabel(0 40000, nogrid) ytitle("")
twoway line all_lt_sec month, lcolor(red) lwidth(medium) title("Long Term Securities") name(plot2,
 replace) ylabel(0 40000, nogrid) ytitle("")
twoway line all_lt_trea month, lcolor(purple) lwidth(medium) title("Long Term Treasuries") name(
plot3, replace) ylabel(0 8000, nogrid) ytitle("")
twoway line all_st_sec month, lcolor(green) lwidth(medium) title("Short Term Securities") name(
plot4, replace) ylabel(0 2000, nogrid) ytitle("")
twoway line all_st_trea month, lcolor(orange) lwidth(medium) title("Short Term Treasuries") name(
plot5, replace) ylabel(0 2000, nogrid) ytitle("")
twoway line all_all_oth_lia month, lcolor(gray) lwidth(medium) title("Other Liabilities") name(
plot6, replace) ylabel(0 7000, nogrid) ytitle("")
graph combine plot1 plot2 plot3 plot4 plot5 plot6, title("Comparison of Liability Types Over Time"
) cols(2)
graph export "C:\Users\shiyq\Desktop\PreDoc\UPenn Predoc Data Analysis\Comparison of Liabilities
Types Over Time.png", as(png) name("Graph")
* To compare each liability type, generate only one plot by:
twoway (line all_total_sec month, lcolor(blue)) (line all_lt_sec month, lcolor(red)) (line
all_lt_trea month, lcolor(green)) (line all_st_sec month, lcolor(orange)) (line all_st_trea month,
 lcolor(purple)) (line all_all_oth_lia month, lcolor(black)), title("Liability Composition Over
Time") ytitle("Liabilities (Billions)") xtitle("Time (Months)") ylabel(0 33000) legend(order(1
"Total Securities" 2 "Long-Term Sec." 3 "Long-Term Treasuries" 4 "Short-Term Sec." 5 "Short-Term
Treasuries" 6 "Other Liabilities"))
graph export "C:\Users\shiyq\Desktop\PreDoc\UPenn Predoc Data Analysis\Liability Composition Over
Time.png", as(png) name("Graph")
*******************************************************************************
*******************************************************************************
***** 1.3 Short-Term Treasury Holdings
gen ratio_priv_offi = priv_st_trea / offi_st_trea
* After generate the ratio, plot the series with tsline:
tsline ratio_priv_offi, title("Ratio of Private to Official S-T Treasury Holdings Over Time")
xtitle("Time (Months)") ytitle("Ratio") lcolor(blue) lwidth(medium)
graph export "C:\Users\shiyq\Desktop\PreDoc\UPenn Predoc Data Analysis\Ratio of Priv to Official
ST-T.png", as(png) name("Graph")
* Save the Dataset file to conclude Question 1
save "C:\Users\shiyq\Desktop\PreDoc\UPenn Predoc Data Analysis\Data_Task_Yuqi.dta", replace
*******************************************************************************
```

```
cd "C:\Users\shiyq\Desktop\PreDoc\UPenn Predoc Data Analysis\Data_Task_Q2"
import excel "C:\Users\shiyq\Desktop\PreDoc\UPenn Predoc Data Analysis\Data_Task_Q2\Q2_Bank_Data.xlsx", sheet("in") firstrow
* Format the data into millions
foreach var in asset cash govbond deposit deposit_checking deposit_saving deposit_time loan_total loan_AA loan_A loan_B loan_C loan_D loan_E loan_F loan_G loan_H corecapital {
    replace `var' = `var' / 1000000
}
format time_id %td
format instant_time %td
describe time_id instant_time
* Generate post-treatment indicator (1 if bank has adopted in or before current period)
gen post = (time_id >= instant_time) if if_instant == 1
replace post = 0 if if_instant == 0
* Event time is the time relative to adoption
gen event_time = time_id - instant_time
replace event_time = . if if_instant == 0
* turn the event time into months format
replace event_time = floor((time_id - instant_time) / 30)
*******************************************************************************
***** 1. Liquidity Ratio
*******************************************************************************
gen liquidity_ratio = (cash + govbond) / asset
xtset bank_id time_id
* The Standard DiD equation:
xtreg liquidity_ratio post i.time_id, fe cluster(bank_id)
* Create event-time dummies for key months (the months used in the regression)
gen event_neg10 = (event_time == -10) // this means 10 months before the adoption
gen event_neg5  = (event_time == -5)
gen event_neg2  = (event_time == -2)
gen event_0     = (event_time == 0) // Date when the payment system adopted
gen event_2     = (event_time == 2)
gen event_5     = (event_time == 5)
gen event_10    = (event_time == 10) // 10 months after
* Run Staggered DiD regression (excluding event_time == -1)
xtreg liquidity_ratio event_neg10 event_neg5 event_neg2 event_0 event_2 event_5 event_10 i.time_id, fe cluster(bank_id)
* Create an indicator for 20 months after adoption
gen event_20 = (event_time == 20)
* Run the event-study regression with `event_20`
xtreg liquidity_ratio event_neg10 event_neg5 event_neg2 event_0 event_2 event_5 event_10 event_20 i.time_id, fe cluster(bank_id)
* Plot the coefficients to check the Parallel Trends Assumption hold or not
coefplot, keep(event_neg10 event_neg5 event_neg2 event_0 event_2 event_5 event_10 event_20 ) vertical xlabel(, angle(45)) yline(0, lcolor(red) lpattern(dash)) title("Event Study: Impact on Liquidity Ratio") xtitle("Months to Adoption") ytitle("Coefficient Estimate") mlabposition(12) mlabgap(0.2) ciopts(lwidth(thin)) msymbol(O) mcolor(blue)
graph export "C:\Users\shiyq\Desktop\PreDoc\UPenn Predoc Data Analysis\Data_Task_Q2\EventStudy for Liquidity Ratio.png", as(png) name("Graph") replace
* Now we could generate the control variables
gen log_assets = log(asset) // Bank Size
gen capital_ratio = corecapital / asset
gen loan_deposit_ratio = loan_total / deposit
* Staggered DiD with Controls:
xtreg liquidity_ratio event_neg10 event_neg5 event_neg2 event_0 event_2 event_5 event_10 event_20 log_assets capital_ratio loan_deposit_ratio cash govbond loan_total i.time_id, fe cluster(bank_id)
* Store both baseline and controls regression results
eststo baseline: xtreg liquidity_ratio event_neg10 event_neg5 event_neg2 event_0 event_2 event_5 event_10 event_20 i.time_id, fe cluster(bank_id)
eststo controls: xtreg liquidity_ratio event_neg10 event_neg5 event_neg2 event_0 event_2 event_5 event_10 event_20 log_assets capital_ratio loan_deposit_ratio cash govbond loan_total i.time_id, fe cluster(bank_id)
* Export to Word
outreg2 [baseline controls] using liquidity_results.doc, replace label ctitle("Baseline", "With Controls") keep(event_neg10 event_neg5 event_neg2 event_0 event_2 event_5 event_10 event_20 log_assets capital_ratio loan_deposit_ratio cash govbond loan_total)
shellout using `"liquidity_results.doc"'
*******************************************************************************
```

```
55  ***** 2. Bank Deposit Ratios
56  ********************************************************************************************
57  * Firstyl we need to define the variables
58  gen checking_ratio = deposit_checking / (deposit + 0.001) // Avoid getting 0
59  gen saving_ratio   = deposit_saving / (deposit + 0.001)
60  gen time_ratio     = deposit_time / (deposit + 0.001)
61  gen log_checking_ratio = log(checking_ratio + 0.001)
62  gen log_saving_ratio   = log(saving_ratio + 0.001)
63  gen log_time_ratio     = log(time_ratio + 0.001)
64  * Standard DiD regression equation: stored separtely
65  eststo check: xtreg log_checking_ratio post i.time_id, fe cluster(bank_id)
66  eststo save: xtreg log_saving_ratio post i.time_id, fe cluster(bank_id)
67  eststo time: xtreg log_time_ratio post i.time_id, fe cluster(bank_id)
68  * Export table
69  esttab check save time using deposit_results.doc, replace b(%9.3f) se(%9.3f) star(* 0.10 ** 0.05
    *** 0.01) label title("Effect of Instant Payments on Deposit Ratios") mtitles("Checking" "Saving"
    "Time") keep(post) compress
70  test event_neg10 event_neg5 event_neg2
71  * Generate the plot for Parallel Trends Assumption each by each:
72  xtreg log_checking_ratio event_neg10 event_neg5 event_neg2 event_0 event_2 event_5 event_10
    event_20 i.time_id, fe cluster(bank_id)
73  coefplot, keep(event_neg10 event_neg5 event_neg2 event_0 event_2 event_5 event_10 event_20 )
    vertical xlabel(, angle(45)) yline(0, lcolor(red) lpattern(dash)) title("Event Study: Impact on
    Checking Ratios") xtitle("Months to Adoption") ytitle("Coefficient Estimate") mlabposition(12)
    mlabgap(0.2) ciopts(lwidth(thin)) msymbol(O) mcolor(blue)
74  graph export "C:\Users\shiyq\Desktop\PreDoc\UPenn Predoc Data Analysis\Data_Task_Q2\Checking
    Ratios.png", as(png) name("Graph")
75  * For Saving Ratio:
76  xtreg log_saving_ratio event_neg10 event_neg5 event_neg2 event_0 event_2 event_5 event_10 event_20
     i.time_id, fe cluster(bank_id)
77  coefplot, keep(event_neg10 event_neg5 event_neg2 event_0 event_2 event_5 event_10 event_20 )
    vertical xlabel(, angle(45)) yline(0, lcolor(red) lpattern(dash)) title("Event Study: Impact on
    Saving Ratios") xtitle("Months to Adoption") ytitle("Coefficient Estimate") mlabposition(12)
    mlabgap(0.2) ciopts(lwidth(thin)) msymbol(O) mcolor(blue)
78  graph export "C:\Users\shiyq\Desktop\PreDoc\UPenn Predoc Data Analysis\Data_Task_Q2\Saving
    Ratios.png", as(png) name("Graph")
79  *For Time Ratio:
80  xtreg log_time_ratio event_neg10 event_neg5 event_neg2 event_0 event_2 event_5 event_10 event_20 i
    .time_id, fe cluster(bank_id)
81  coefplot, keep(event_neg10 event_neg5 event_neg2 event_0 event_2 event_5 event_10 event_20 )
    vertical xlabel(, angle(45)) yline(0, lcolor(red) lpattern(dash)) title("Event Study: Impact on
    Time Ratios") xtitle("Months to Adoption") ytitle("Coefficient Estimate") mlabposition(12) mlabgap
    (0.2) ciopts(lwidth(thin)) msymbol(O) mcolor(blue)
82  graph export "C:\Users\shiyq\Desktop\PreDoc\UPenn Predoc Data Analysis\Data_Task_Q2\Time
    Ratios.png", as(png) name("Graph")
83  *\ Since the parallel assumption of saving deposit does not hold, then I just generate the
    regression table for checking and time ratios with baseline and controls results:
84
85  eststo baseline_1: xtreg log_checking_ratio event_neg10 event_neg5 event_neg2 event_0 event_2
    event_5 event_10 event_20 i.time_id, fe cluster(bank_id)
86  eststo controls_1: xtreg log_checking_ratio event_neg10 event_neg5 event_neg2 event_0 event_2
    event_5 event_10 event_20 log_assets capital_ratio loan_deposit_ratio cash govbond loan_total i.
    time_id, fe cluster(bank_id)
87  eststo baseline_2: xtreg log_time_ratio event_neg10 event_neg5 event_neg2 event_0 event_2 event_5
    event_10 event_20 i.time_id, fe cluster(bank_id)
88  eststo controls_2: xtreg log_time_ratio event_neg10 event_neg5 event_neg2 event_0 event_2 event_5
    event_10 event_20 log_assets capital_ratio loan_deposit_ratio cash govbond loan_total i.time_id,
    fe cluster(bank_id)
89  * Then outreg2 the table:
90  outreg2 [baseline_1 controls_1 baseline_2 controls_2] using ratios_results.doc, replace label
    ctitle("Baseline", "With Controls", "Baseline", "With Controls") keep(event_neg10 event_neg5
    event_neg2 event_0 event_2 event_5 event_10 event_20 log_assets capital_ratio loan_deposit_ratio
    cash govbond loan_total)
91  shellout using `"ratios_results.doc"'
92  ********************************************************************************************
93  ***** 3. Risky Loans
94  ********************************************************************************************
95  drop _est_check _est_save _est_time _est_controls_1 _est_baseline_2 _est_controls_2
```

```
    _est_baseline_1
96  * I decided to divide the loan categories into two groups, low risk and high risk to do the
    research
97  gen low_risk_ratio = (loan_AA + loan_A + loan_B + loan_C) / loan_total
98  gen high_risk_ratio = (loan_D + loan_E + loan_F + loan_G + loan_H) / loan_total
99  gen log_low_risk = log(low_risk_ratio + 0.001)
100 gen log_high_risk = log(high_risk_ratio + 0.001)
101 * Still run the Standard DiD first
102 xtreg log_low_risk post i.time_id, fe cluster(bank_id)
103 xtreg log_high_risk post i.time_id, fe cluster(bank_id)
104 * After, the plot of parallel trends of Low Risk is generated
105 xtreg log_low_risk event_neg10 event_neg5 event_neg2 event_0 event_2 event_5 event_10 event_20 i.
    time_id, fe cluster(bank_id)
106 coefplot, keep(event_neg10 event_neg5 event_neg2 event_0 event_2 event_5 event_10 event_20 )
    vertical xlabel(, angle(45)) yline(0, lcolor(red) lpattern(dash)) title("Event Study: Impact on
    Low Risk Loan") xtitle("Months to Adoption") ytitle("Coefficient Estimate") mlabposition(12)
    mlabgap(0.2) ciopts(lwidth(thin)) msymbol(O) mcolor(blue)
107 graph export "C:\Users\shiyq\Desktop\PreDoc\UPenn Predoc Data Analysis\Data_Task_Q2\low risk
    loan.png", as(png) name("Graph")
108 * The Plot of High Risk
109 xtreg log_high_risk event_neg10 event_neg5 event_neg2 event_0 event_2 event_5 event_10 event_20 i.
    time_id, fe cluster(bank_id)
110 coefplot, keep(event_neg10 event_neg5 event_neg2 event_0 event_2 event_5 event_10 event_20 )
    vertical xlabel(, angle(45)) yline(0, lcolor(red) lpattern(dash)) title("Event Study: Impact on
    High Risk Loan") xtitle("Months to Adoption") ytitle("Coefficient Estimate") mlabposition(12)
    mlabgap(0.2) ciopts(lwidth(thin)) msymbol(O) mcolor(blue)
111 graph export "C:\Users\shiyq\Desktop\PreDoc\UPenn Predoc Data Analysis\Data_Task_Q2\high risk
    loan.png", as(png) name("Graph")
112 * Want to see the joint significance
113 test event_neg10 event_neg5 event_neg2
114 * Kind of re-order the dataset to make it clean
115 sort bank_id time_id
116 list bank_id time_id, sepby(bank_id)
117 eststo clear
118 * Starting to run the Staggered DiD regressions with controls:
119 eststo baseline_low: xtreg log_low_risk event_neg10 event_neg5 event_neg2 event_0 event_2 event_5
    event_10 event_20 i.time_id, fe cluster(bank_id)
120 eststo controls_low: xtreg log_low_risk event_neg10 event_neg5 event_neg2 event_0 event_2 event_5
    event_10 event_20 log_assets capital_ratio loan_deposit_ratio cash govbond loan_total i.time_id,
    fe cluster(bank_id)
121 eststo baseline_high: xtreg log_high_risk event_neg10 event_neg5 event_neg2 event_0 event_2
    event_5 event_10 event_20 i.time_id, fe cluster(bank_id)
122 eststo controls_high: xtreg log_high_risk event_neg10 event_neg5 event_neg2 event_0 event_2
    event_5 event_10 event_20 log_assets capital_ratio loan_deposit_ratio cash govbond loan_total i.
    time_id, fe cluster(bank_id)
123 outreg2 [baseline_low controls_low baseline_high controls_high] using risk_ratios_results.doc,
    replace label ctitle("Baseline", "With Controls", "Baseline", "With Controls") keep(event_neg10
    event_neg5 event_neg2 event_0 event_2 event_5 event_10 event_20 log_assets capital_ratio
    loan_deposit_ratio cash govbond loan_total)
124 shellout using `"risk_ratios_results.doc"'
125 ********************************************************************************
126 ********************************************************************************$
127
128
129
130
```