

TBM

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2023-06-18

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loading the data

```
# library()

library(readxl)
library(tidyverse)

## -- Attaching packages ----- tidyverse 1.3.2 --
## v ggplot2 3.4.0      v purrr  1.0.1
## v tibble  3.1.8      v dplyr  1.1.0
## v tidyr   1.3.0      v stringr 1.5.0
## v readr   2.1.3      v forcats 1.0.0
## -- Conflicts ----- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()

library(stargazer)

##
## Please cite as:
##
## Hlavac, Marek (2022). stargazer: Well-Formatted Regression and Summary Statistics Tables.
## R package version 5.2.3. https://CRAN.R-project.org/package=stargazer

library(ggplot2)
library(plm)

## Warning: package 'plm' was built under R version 4.2.3

##
## Attaching package: 'plm'
##
## The following objects are masked from 'package:dplyr':
##
##   between, lag, lead
```

```
library(urca)
```

```
## Warning: package 'urca' was built under R version 4.2.3
```

```
# loading the data and grooming the data
data <- read_excel("Data for analysis.xlsx",
                  sheet = "Final",
                  col_types = c(rep("text",5), rep('numeric',32)))
data <- as.data.frame(na.omit(data))
```

Preparing the initial graphs

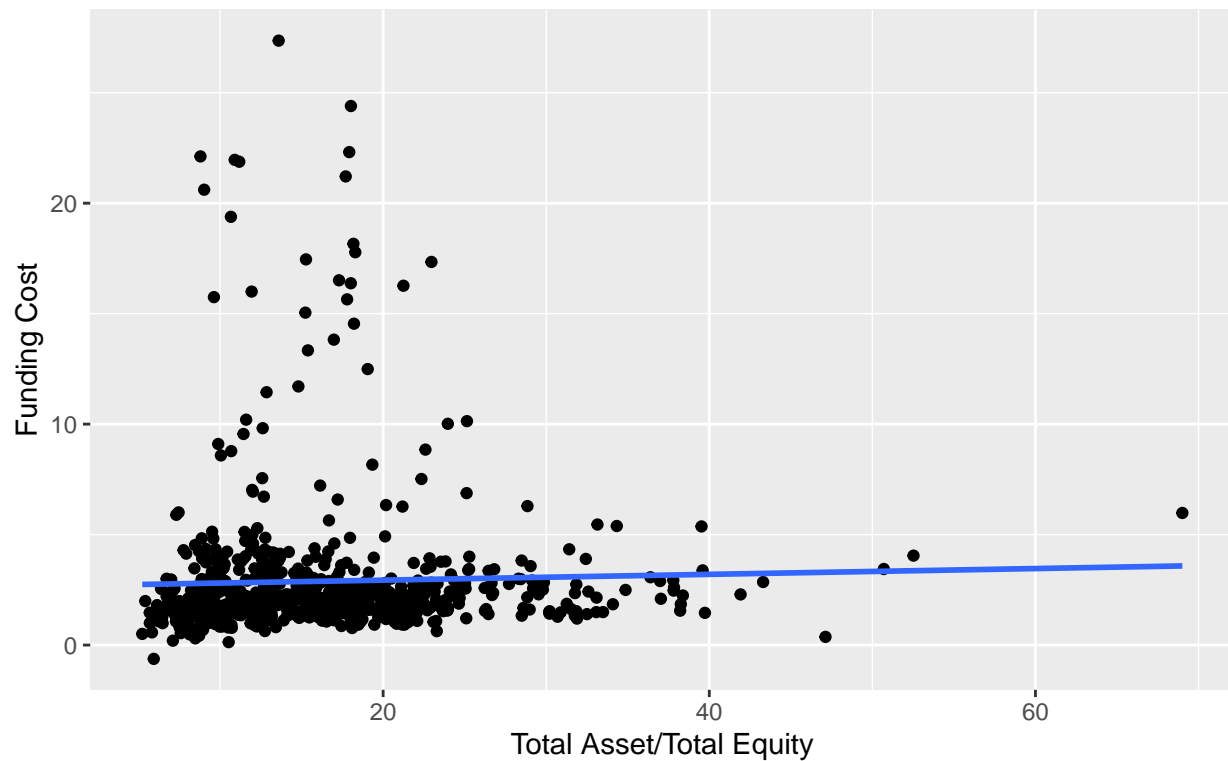
```
# 1st one -----

# for all

data %>%
  #group_by(countryOfOrigin) %>%
  ggplot(mapping = aes(x=TA_TE, y=FundingCost))+
  geom_point()+
  geom_smooth(method = 'lm', se=FALSE)+
  #facet_wrap(facets = ~countryOfOrigin, scales = 'free_y', ncol = 2)+
  labs(title = "Cost of Debt Funding",
       # subtitle = "Categories are based on bank regions",
       caption = "Data source: Bloomberg") +
  xlab('Total Asset/Total Equity') + ylab('Funding Cost')+
  theme(legend.position = 'none',
       plot.caption = element_text(hjust = 0))
```

```
## 'geom_smooth()' using formula = 'y ~ x'
```

Cost of Debt Funding



Data source: Bloomberg

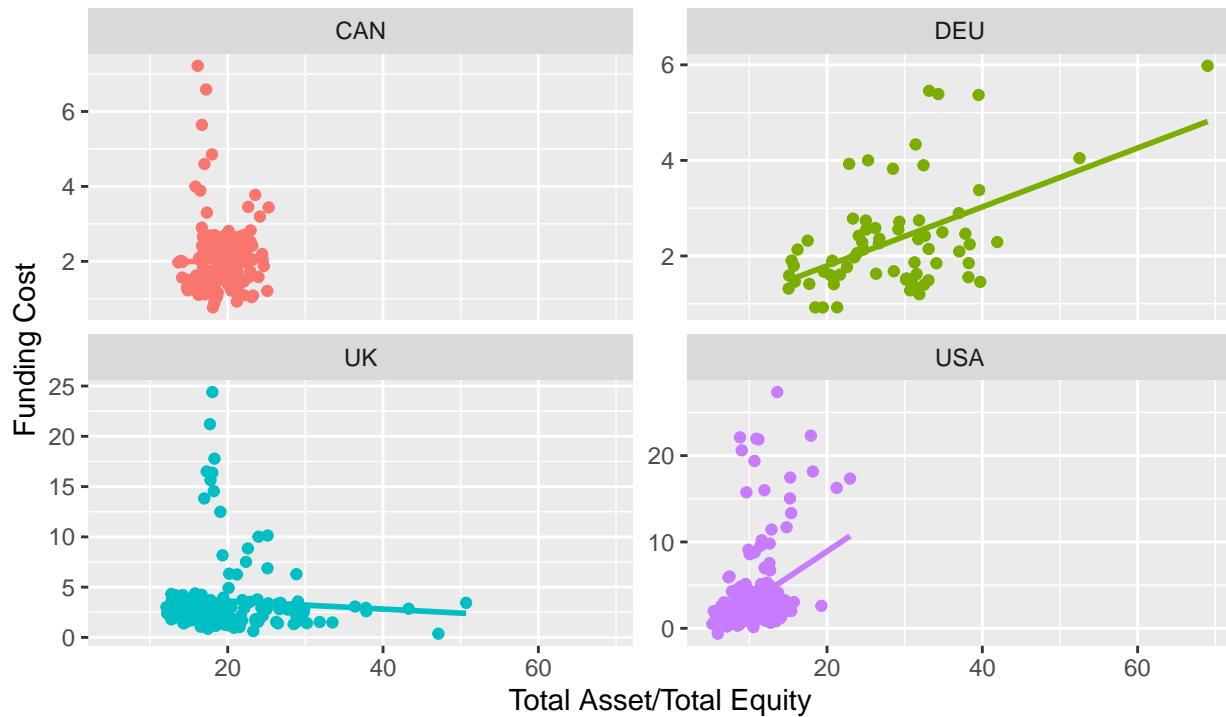
for country wise

```
data %>%
  group_by(countryOfOrigin) %>%
  ggplot(mapping = aes(x=TA_TE, y=FundingCost,col=countryOfOrigin))+
  geom_point()+
  geom_smooth(method = 'lm', se=FALSE)+
  facet_wrap(facets = ~countryOfOrigin, scales = 'free_y', ncol = 2)+
  labs(title = "Cost of Debt Funding",
       subtitle = "Categories are based on bank regions",
       caption = "Data source: Bloomberg") +
  xlab('Total Asset/Total Equity') + ylab('Funding Cost')+
  theme(legend.position = 'none',
       plot.caption = element_text(hjust = 0))
```

```
## 'geom_smooth()' using formula = 'y ~ x'
```

Cost of Debt Funding

Categories are based on bank regions

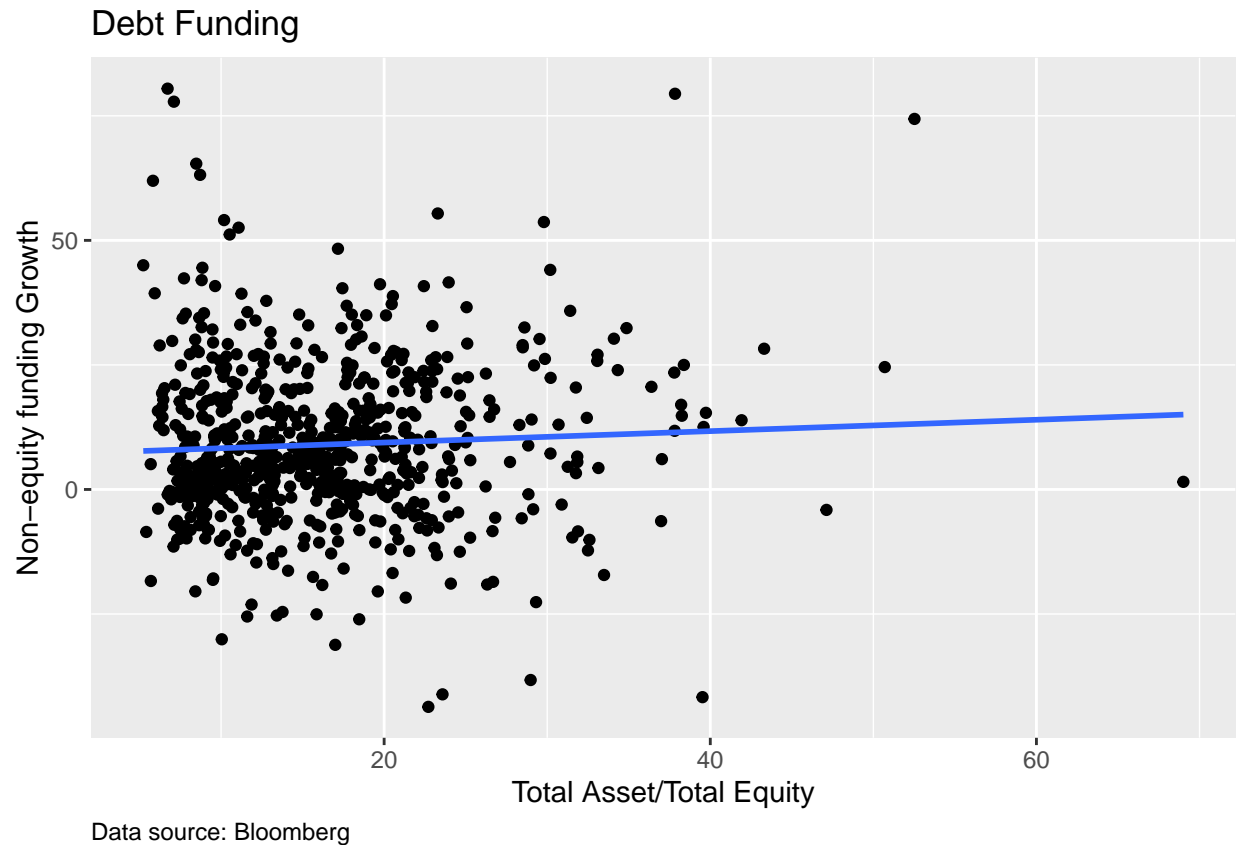


Data source: Bloomberg

```
# 2nd one -----
# for all

data %>%
  # group_by(countryOfOrigin) %>%
  ggplot(mapping = aes(x=TA_TE, y=TFundGrow))+
  geom_point()+
  geom_smooth(method = 'lm', se=FALSE)+
  # facet_wrap(facets = ~countryOfOrigin, scales = 'free_y', ncol = 2)+
  labs(title = "Debt Funding",
        # subtitle = "Categories are based on bank regions",
        caption = "Data source: Bloomberg") +
  xlab('Total Asset/Total Equity') + ylab('Non-equity funding Growth')+
  theme(legend.position = 'none',
        plot.caption = element_text(hjust = 0))
```

```
## 'geom_smooth()' using formula = 'y ~ x'
```



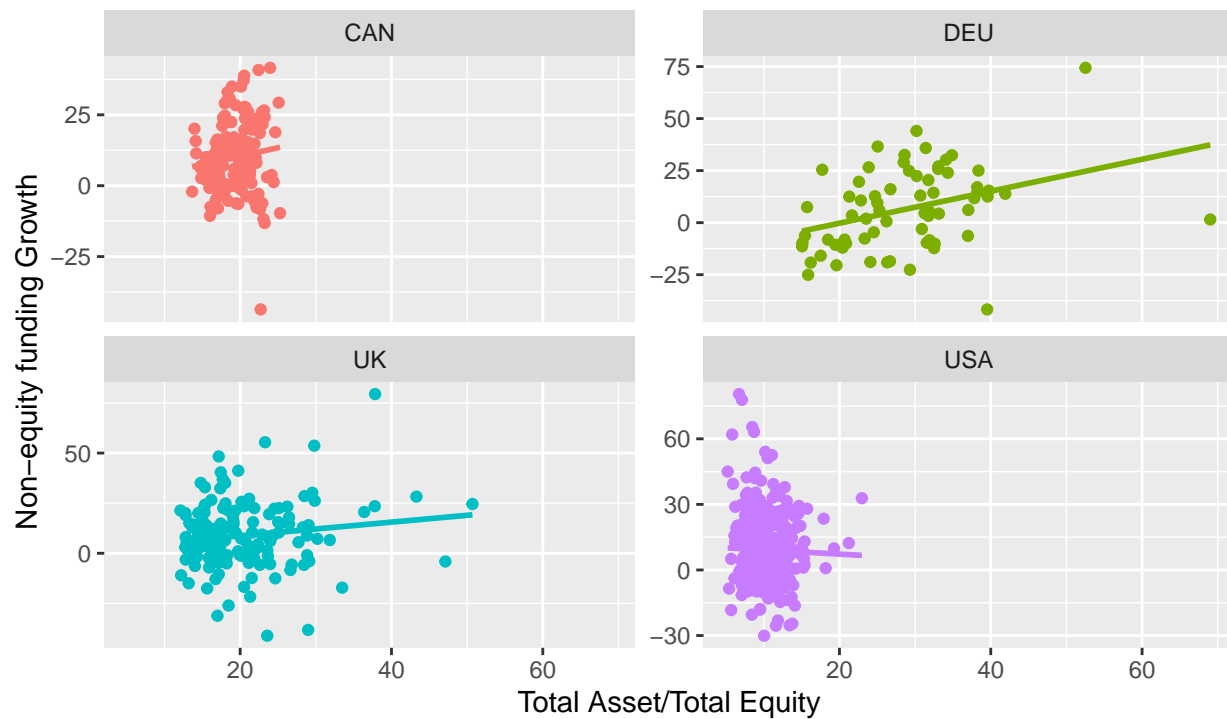
for country wise

```
data %>%
  group_by(countryOfOrigin) %>%
  ggplot(mapping = aes(x=TA_TE, y=TFundGrow,col=countryOfOrigin))+
  geom_point()+
  geom_smooth(method = 'lm', se=FALSE)+
  facet_wrap(facets = ~countryOfOrigin, scales = 'free_y', ncol = 2)+
  labs(title = "Debt Funding",
       subtitle = "Categories are based on bank regions",
       caption = "Data source: Bloomberg") +
  xlab('Total Asset/Total Equity') + ylab('Non-equity funding Growth')+
  theme(legend.position = 'none',
       plot.caption = element_text(hjust = 0))
```

'geom_smooth()' using formula = 'y ~ x'

Debt Funding

Categories are based on bank regions

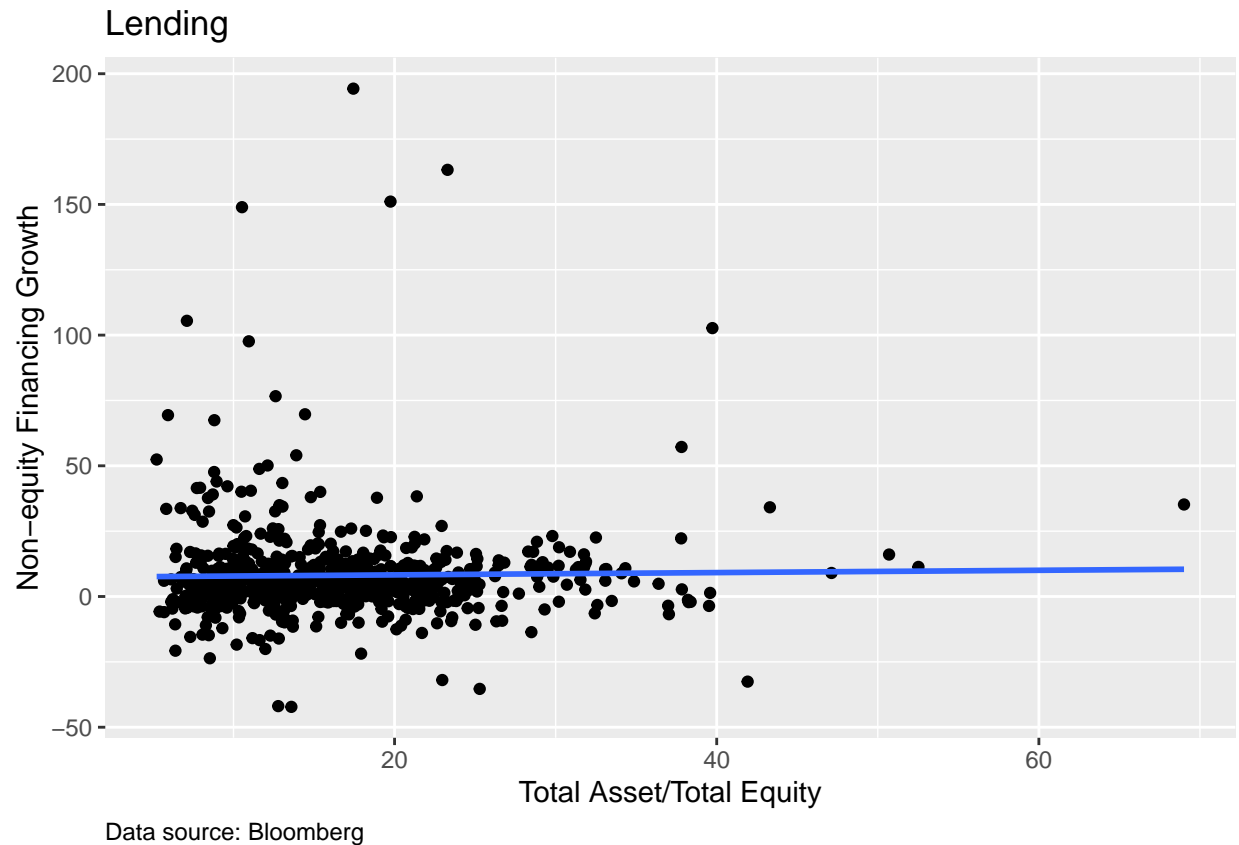


Data source: Bloomberg

```
# 3rd -----
# for all()

data %>%
  # group_by(countryOfOrigin) %>%
  ggplot(mapping = aes(x=TA_TE, y=LG))+
  geom_point()+
  geom_smooth(method = 'lm', se=FALSE)+
  # facet_wrap(facets = ~countryOfOrigin, scales = 'free_y', ncol = 2)+
  labs(title = "Lending",
        # subtitle = "Categories are based on bank regions",
        caption = "Data source: Bloomberg") +
  xlab('Total Asset/Total Equity') + ylab('Non-equity Financing Growth')+
  theme(legend.position = 'none',
        plot.caption = element_text(hjust = 0))
```

```
## 'geom_smooth()' using formula = 'y ~ x'
```



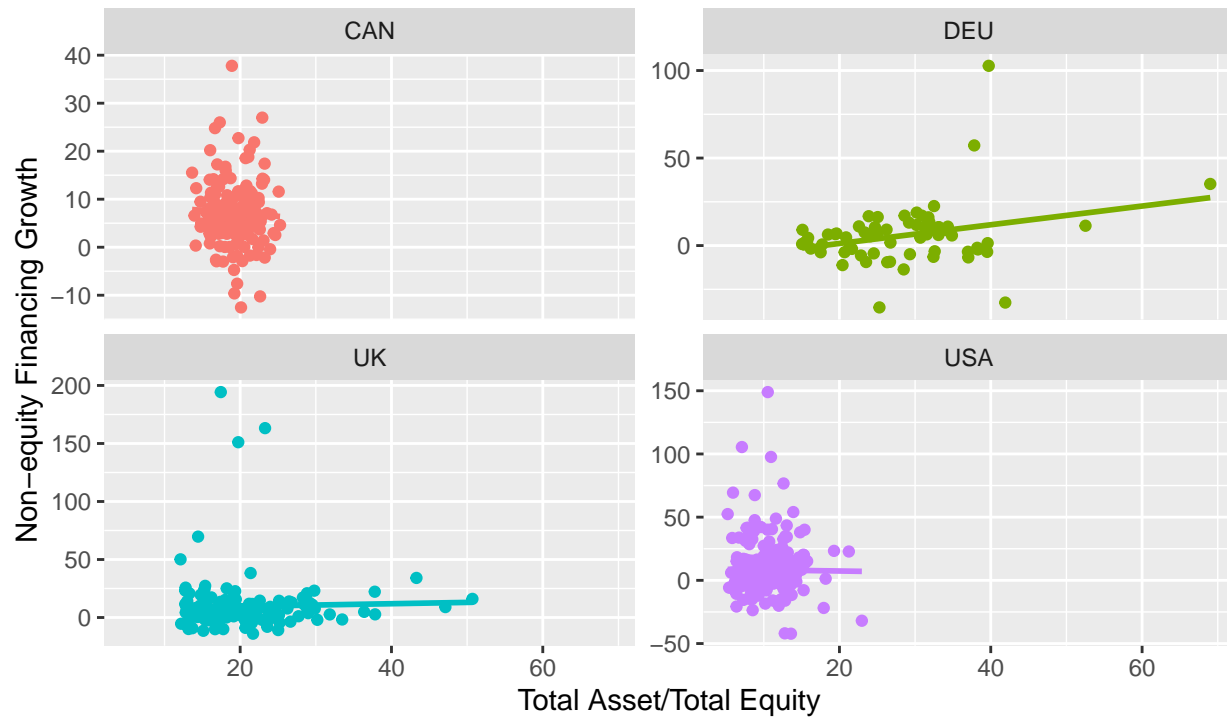
for country wise

```
data %>%
  group_by(countryOfOrigin) %>%
  ggplot(mapping = aes(x=TA_TE, y=LG,col=countryOfOrigin))+
  geom_point()+
  geom_smooth(method = 'lm', se=FALSE)+
  facet_wrap(facets = ~countryOfOrigin, scales = 'free_y', ncol = 2)+
  labs(title = "Lending",
        subtitle = "Categories are based on bank regions",
        caption = "Data source: Bloomberg") +
  xlab('Total Asset/Total Equity') + ylab('Non-equity Financing Growth')+
  theme(legend.position = 'none',
        plot.caption = element_text(hjust = 0))
```

'geom_smooth()' using formula = 'y ~ x'

Lending

Categories are based on bank regions



Data source: Bloomberg

Summary statistics

```
# High Levered and low levered banks and their summary stats

# summary statistics for the banks (need to add all the variables)

leverdUnleverd <- data %>%
  group_by(bankName) %>%
  summarise(
    N = n(),
    Min = min(TA_TE),
    Mean = mean(TA_TE),
    q1 = quantile(TA_TE, probs = 0.25),
    Median = median(TA_TE),
    q3 = quantile(TA_TE, probs = 0.75),
    Max = max(TA_TE))

# 1st and 4th quantile of the overall asset/equity

data %>%
  summarise(
    quantile = quantile(TA_TE, probs = c(0.25, 0.75))
```


)

```
## Warning: Returning more (or less) than 1 row per 'summarise()' group was deprecated in
## dplyr 1.1.0.
## i Please use 'reframe()' instead.
## i When switching from 'summarise()' to 'reframe()', remember that 'reframe()'
## always returns an ungrouped data frame and adjust accordingly.

## quantile
## 1 10.1107
## 2 20.1072
```

finding the levered and unlevered firms

```
leverdUnleverd %>%
  filter(q1<=10.11 | q1>=20.12) %>%
  arrange(q1)
```

```
## # A tibble: 14 x 8
##   bankName      N   Min  Mean   q1 Median   q3   Max
##   <chr>      <int> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>
## 1 Santander Holdings    24  5.23  8.88  6.33  8.40  11.8  13.9
## 2 Capial One Financial  24  5.82  7.27  6.65  7.11  7.67  9.63
## 3 Truist Financial    24  7.11  9.26  7.68  9.21  10.4  13.0
## 4 M&T Bank           24  7.30  8.85  7.82  8.69  9.46  12.5
## 5 PNC                 24  7.27  8.92  7.96  8.53  10.0  12.2
## 6 Fifth Third Bancorp  24  7.88  9.47  8.82  8.95  10.1  12.1
## 7 Bank of New York Mellon 24  6.72  9.72  8.90  9.83  10.3  12.8
## 8 KeyCorp             24  8.07  10.6  8.94  9.72  12.5  14.1
## 9 Bank of America     24  8.22  10.7  9.15  10.3  11.9  15.0
## 10 US Bancorp          24  8.71  10.0  9.30  10.0  10.4  13.2
## 11 Citigroup Inc       24  7.76  11.6  9.75  11.7  12.7  19.3
## 12 Commerzbank        34 15.1  28.0  20.5  30.8  32.6  41.9
## 13 Barclays           34 17.0  24.6  20.5  23.6  26.8  43.3
## 14 Deutsche Bank      33 18.5  29.6  23.3  26.2  33.1  69.0
```

partitioning the data in the highly levered and lower levered dataset

```
dataHL <- data %>%
  # select(bankName, Year, LL, HL) %>%
  mutate(
    LL = case_when(
      bankName== "Santander Holdings"~1,
      bankName== "Capial One Financial"~1,
      bankName== "Truist Financial"~1,
      bankName== "M&T Bank"~1,
      bankName== "PNC"~1,
      bankName== "Fifth Third Bancorp"~1,
      bankName== "Bank of New York Mellon"~1,
      bankName== "KeyCorp"~1,
      bankName== "Bank of America"~1,
      bankName== "US Bancorp"~1,
```

```

    bankName== "Citigroup Inc"~1,
    TRUE ~ 0),
  HL = case_when(
    bankName== "Barclays"~1,
    bankName== "Commerzbank"~1,
    bankName== "Deutsche Bank"~1,
    TRUE ~ 0))

dataHL %>%
  # group_by(LL,HL) %>%
  filter(HL==1 | LL==1) %>%
  group_by(LL,HL) %>%
  summarise(
    obs=n(),
    assets=mean(TA/1000),
    costOfDebtFinancing = mean(FundingCost),
    growthRateOfDebtFinancing =mean(TFundGrow),
    growthRateOfLending = mean(LG),
    assetRisk = sd(TA/1000),
    ROA = mean(ROA))%>%
  t() %>%
  round(digits = 3)

```

'summarise()' has grouped output by 'LL'. You can override using the '.groups' argument.

```

##           [,1]      [,2]
## LL           0.000    1.000
## HL           1.000    0.000
## obs          101.000  264.000
## assets        1037.813  479.356
## costOfDebtFinancing    2.276    2.083
## growthRateOfDebtFinancing  7.266    9.364
## growthRateOfLending     5.856    8.222
## assetRisk           803.587  682.449
## ROA              0.223    1.112

```

summary statistics for all the variables

```

summData <- as.matrix(data[,6:dim(data)[2]]) # just numeric variables
summaryResults <- list()

allMin <- apply(summData, MARGIN = 2, FUN = min, na.rm=TRUE)
allMean <- apply(summData, MARGIN = 2, FUN = mean, na.rm=TRUE)
allMax <- apply(summData, MARGIN = 2, FUN = max, na.rm=TRUE)
allSD <- apply(summData, MARGIN = 2, FUN = sd, na.rm=TRUE)
allCorr <- round(cor(summData[, -c(1:4)]), digits = 4) # maybe a heatmap
summaryResults$All <- round(data.frame(allMin, allMean, allMax, allSD), digits = 3)

```

Need to calculate panel wise summary (country and year wise)

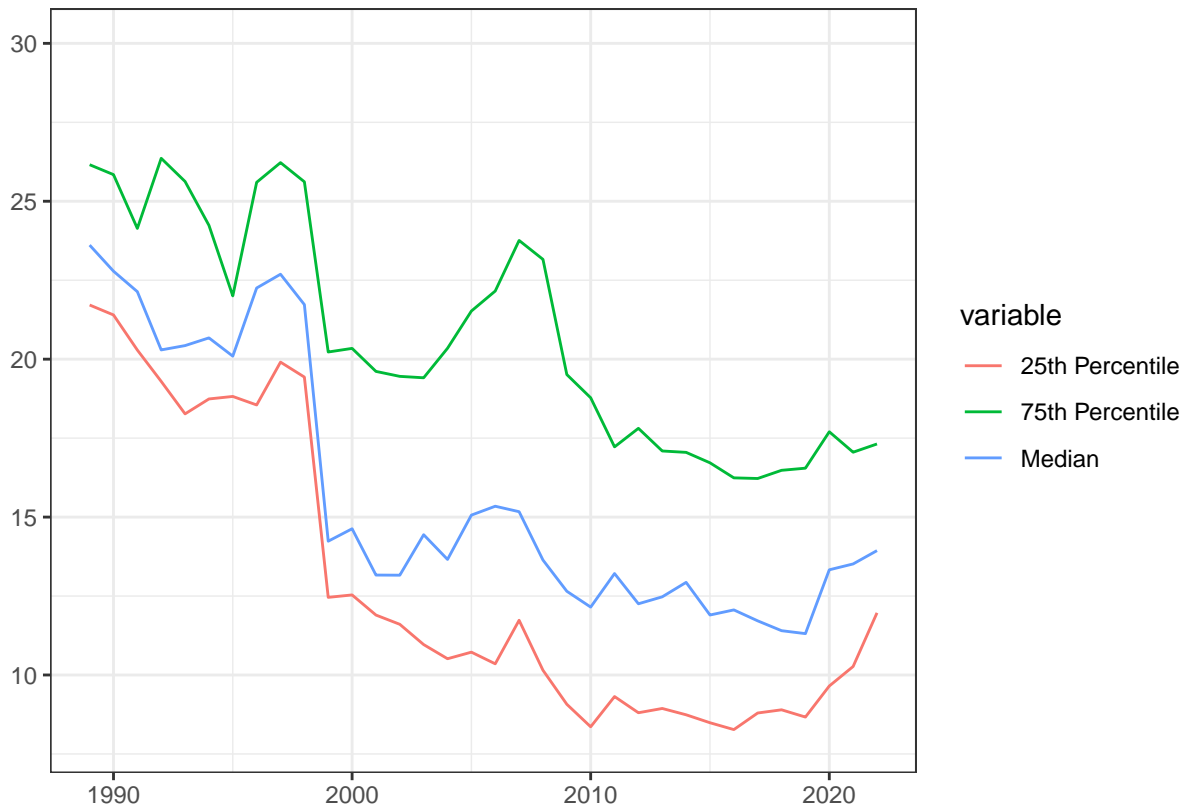
correlation heatmap

Book of envelop calc and their figures

```
# Asset and total equity (i)

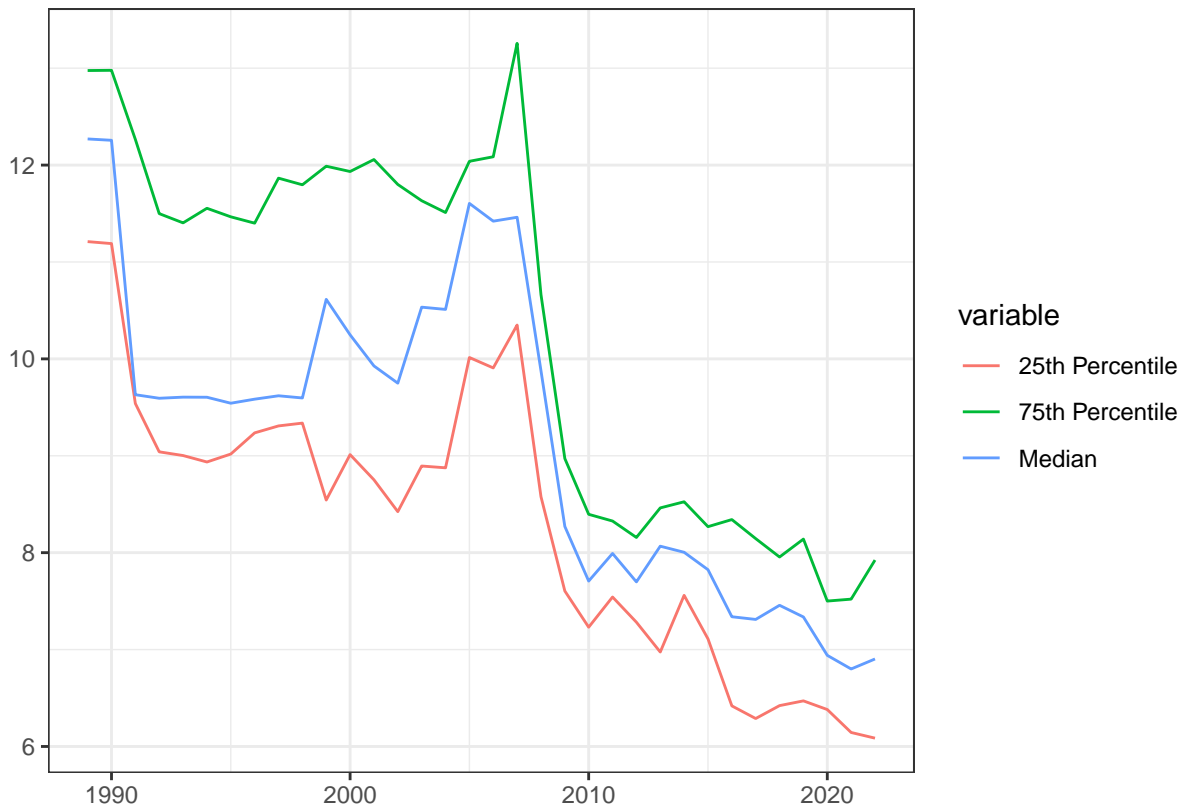
dataFig <- data
dataFig$year <- as.numeric(dataFig$year)

dataFig %>%
  group_by(year) %>%
  summarise(
    `Median`=median(TA_TE),
    `25th Percentile` = quantile(TA_TE, probs = 0.25),
    `75th Percentile` = quantile(TA_TE, probs = 0.75)
  ) %>%
  ungroup() %>%
  pivot_longer(cols = -year, names_to = "variable", values_to = "value") %>%
  ggplot(mapping = aes(x=year, y=value, col=variable))+
  geom_line()+
  ylim(c(8,30))+
  theme_bw()+
  xlab('')+
  ylab('')
```



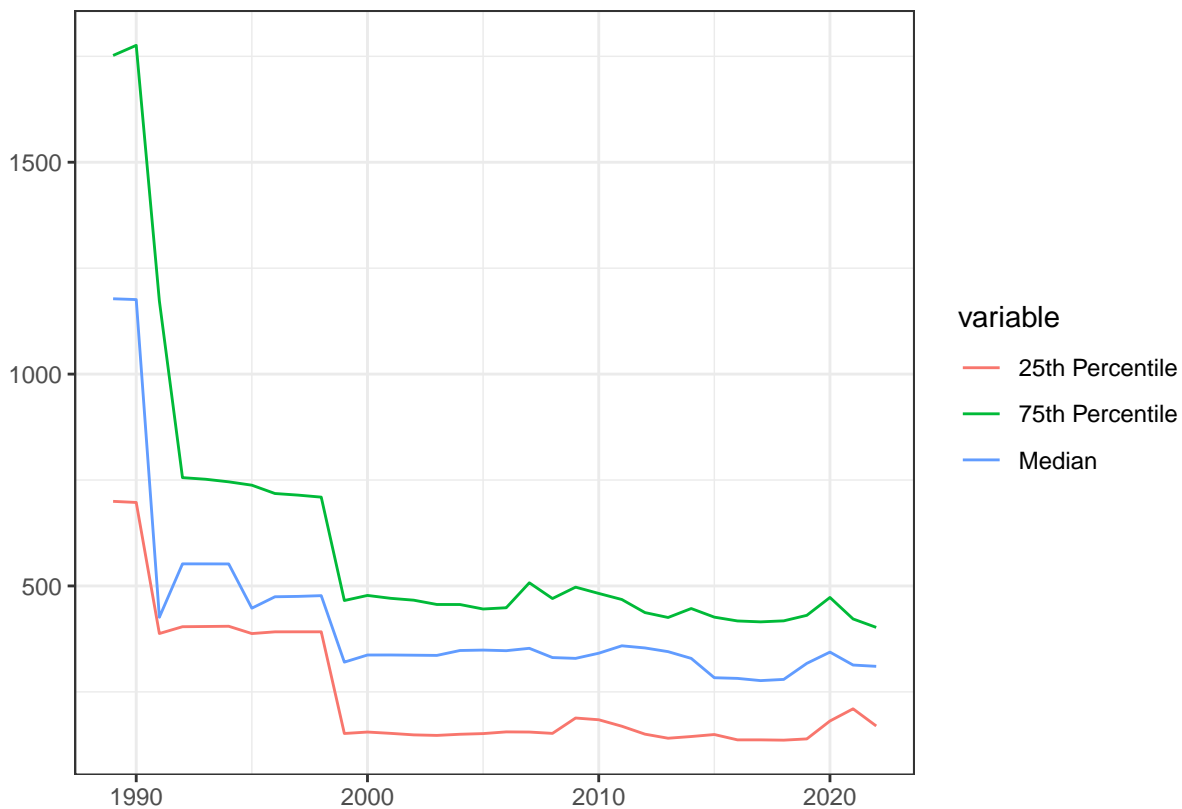
```
# RWA and TierCap (i)

dataFig %>%
  group_by(year) %>%
  summarise(
    `Median` = median(RWA_TierCap),
    `25th Percentile` = quantile(RWA_TierCap, probs = 0.25),
    `75th Percentile` = quantile(RWA_TierCap, probs = 0.75)
  ) %>%
  ungroup() %>%
  pivot_longer(cols = -year, names_to = "variable", values_to = "value") %>%
  ggplot(mapping = aes(x=year, y=value, col=variable))+
  geom_line()+
  theme_bw()+
  xlab('')+
  ylab('')
```



Total fair value of the asset and the market value of the equity (need the market value of equity) (i

```
dataFig %>%
  group_by(year) %>%
  summarise(
    `Median`=median(FVA_TCE),
    `25th Percentile` = quantile(FVA_TCE, probs = 0.25),
    `75th Percentile` = quantile(FVA_TCE, probs = 0.75)
  ) %>%
  ungroup() %>%
  pivot_longer(cols = -year,names_to = "variable",values_to = "value") %>%
  ggplot(mapping = aes(x=year, y=value, col=variable))+
  geom_line()+
  theme_bw()+
  xlab('')+
  ylab('')
```



Regression analysis

Proposition 1: Elasticity of bank activity with respect to bank capital

model results

```
q1modeli <- plm(formula = log(TA)~log(TCE),model = 'within',data = data)
q1modelii <- plm(formula = log(TA)~log(TCE)+ROA,model = 'within',data = data)
q1modeliii <- plm(formula = log(TA)~log(TCE)+ROA,model = 'within',index = c('bankID'), data = data)
q1modeliv <- plm(formula = log(TA)~log(TCE)+ROA,model = 'within',index = c('bankID','year'),data = data)
q1modelv <- plm(formula = log(TA)~log(TCE)+ROA,model = 'within',effect = 'twoways',index = c('bankID','year'),data = data)
```

compiling the results

```
result1 <- stargazer(q1modeli,q1modelii,q1modeliii,q1modeliv,q1modelv, type = 'text',
  omit.summary.stat = 'mean',header = FALSE,
  digits = 3)
```

##

=====

##

Dependent variable:

##

##

log(TA)

```
##              (1)              (2)              (3)
## -----
## log(TCE)      1.050***      1.024***      0.868***
##              (0.018)      (0.015)      (0.009)
##
## ROA           -0.421***      -0.088***
##              (0.025)      (0.015)
## -----
## Observations    709          709          709
## R2              0.831        0.881        0.936
## Adjusted R2     0.823        0.875        0.933
## F Statistic  3,318.591*** (df = 1; 674) 2,490.432*** (df = 2; 673) 4,957.591*** (df = 2; 681) 4,957.5
## =====
## Note:
```

```
result1
```

```
## [1] ""
## [2] "=====
## [3] "
## [4] "
## [5] "
## [6] "              (1)              (2)              log(TA)
## [7] "              (3)
## [8] "log(TCE)      1.050***      1.024***      0.868***
## [9] "              (0.018)      (0.015)      (0.009)
## [10] "
## [11] "ROA           -0.421***      -0.088***
## [12] "              (0.025)      (0.015)
## [13] "
## [14] "-----
## [15] "Observations    709          709          709
## [16] "R2              0.831        0.881        0.936
## [17] "Adjusted R2     0.823        0.875        0.933
## [18] "F Statistic  3,318.591*** (df = 1; 674) 2,490.432*** (df = 2; 673) 4,957.591*** (df = 2; 681) 4
## [19] "=====
## [20] "Note:
```

```
# coeftest
lmtest::coeftest(q1modeli,vcovHC(q1modeli,type = 'HC0',cluster = 'group'))
```

```
##
## t test of coefficients:
##
##      Estimate Std. Error t value Pr(>|t|)
## log(TCE) 1.049714  0.006856 153.11 < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
# serial correlation method
pbgttest(q1modeli,order = 1)
```

```
##
## Breusch-Godfrey/Wooldridge test for serial correlation in panel models
##
## data: log(TA) ~ log(TCE)
## chisq = 150.23, df = 1, p-value < 2.2e-16
## alternative hypothesis: serial correlation in idiosyncratic errors
```

```
pbgttest(q1modelii,order = 1)
```

```
##
## Breusch-Godfrey/Wooldridge test for serial correlation in panel models
##
## data: log(TA) ~ log(TCE) + ROA
## chisq = 97.914, df = 1, p-value < 2.2e-16
## alternative hypothesis: serial correlation in idiosyncratic errors
```

```
pbgttest(q1modeliii,order = 1)
```

```
##
## Breusch-Godfrey/Wooldridge test for serial correlation in panel models
##
## data: log(TA) ~ log(TCE) + ROA
## chisq = 405.07, df = 1, p-value < 2.2e-16
## alternative hypothesis: serial correlation in idiosyncratic errors
```

```
pbgttest(q1modeliv,order = 1)
```

```
##
## Breusch-Godfrey/Wooldridge test for serial correlation in panel models
##
## data: log(TA) ~ log(TCE) + ROA
## chisq = 405.07, df = 1, p-value < 2.2e-16
## alternative hypothesis: serial correlation in idiosyncratic errors
```

```
pbgttest(q1modelv,order = 1)
```

```
##
## Breusch-Godfrey/Wooldridge test for serial correlation in panel models
##
## data: log(TA) ~ log(TCE) + ROA
## chisq = 418.59, df = 1, p-value < 2.2e-16
## alternative hypothesis: serial correlation in idiosyncratic errors
```

Proposition 2: How does equity react to changes in the business and financial cycle?

- growth rate of common equity == gdp growth+lag(common equity growth)+ROA+IFRS, index=('bankID') —(i)
- growth rate of common equity == stock market growth + lag(common equity growth)+ROA+IFRS, index=('bankID') —(ii)

- growth rate of common equity == gdp growth:crisis_II+lag(common equity growth)+ROA+IFRS, index=('bankID') ——(iii)
- growth rate of common equity == stock market growth:crisis_II+lag(common equity growth)+ROA+IFRS, index=('bankID') ——(iv)
- growth rate of Tier 1 capital == gdp growth+lag(growth rate of Tier 1 capita)+ROA+IFRS, index=('bankID') ——(i)
- growth rate of Tier 1 capital == stock market growth +lag(growth rate of Tier 1 capita)+ROA+IFRS, index=('bankID') ——(ii)
- growth rate of Tier 1 capital == gdp growth:crisis_II + lag(growth rate of Tier 1 capita)+ROA+IFRS, index=('bankID') ——(iii)
- growth rate of Tier 1 capital == stock market growth:crisis_II +lag(growth rate of Tier 1 capita)+ROA+IFRS, index=('bankID') ——(iv)

```
# models

q2_1modeli <- plm(formula = TCEG~lag(TCEG)+GDPGrowth+ROA+IFRS,
                  index = 'bankID',model = 'within',data = data)

q2_1modelii <- plm(formula = TCEG~lag(TCEG)+SMGSnP500+ROA+IFRS,
                  index = 'bankID',model = 'within',data = data)

q2_1modeliii <- plm(formula = TCEG~lag(TCEG)+GDPGrowth:crisisGfc+ROA+IFRS,
                  index = 'bankID',model = 'within',data = data)

q2_1modeliv <- plm(formula = TCEG~lag(TCEG)+SMGSnP500:crisisGfc+ROA+IFRS,
                  index = 'bankID',model = 'within',data = data)

# results

stargazer(q2_1modeli,q2_1modelii,q2_1modeliii,q2_1modeliv, type = 'text',
          omit.summary.stat = 'mean',
          digits=3)
```

```
##
## =====
##                               Dependent variable:
##                               -----
##                               TCEG
##                               (1)      (2)      (3)      (4)
## -----
## lag(TCEG)                -0.075**  -0.078**  -0.071*  -0.077**
##                          (0.037)   (0.038)   (0.040)   (0.039)
##
## GDPGrowth                -1.045***
##                          (0.335)
##
## SMGSnP500                  -0.080*
##                          (0.044)
##
## ROA                      11.498*** 10.466*** 9.980*** 10.138***
```

```

##                (1.345)   (1.289)   (1.262)   (1.293)
##
## GDPGrowth:crisisGfc                -0.559
##                                (0.626)
##
## SMGSnP500:crisisGfc                -0.045
##                                (0.076)
##
## -----
## Observations                683        683        683        683
## R2                        0.101        0.093        0.089        0.089
## Adjusted R2              0.063        0.054        0.050        0.050
## F Statistic (df = 3; 654) 24.609*** 22.251*** 21.340*** 21.175***
## =====
## Note:                        *p<0.1; **p<0.05; ***p<0.01

# serial correlatio test

pbgttest(q2_1modeli,order = 1)

##
## Breusch-Godfrey/Wooldridge test for serial correlation in panel models
##
## data:  TCEG ~ lag(TCEG) + GDPGrowth + ROA + IFRS
## chisq = 0.55413, df = 1, p-value = 0.4566
## alternative hypothesis: serial correlation in idiosyncratic errors

pbgttest(q2_1modelii,order = 1)

##
## Breusch-Godfrey/Wooldridge test for serial correlation in panel models
##
## data:  TCEG ~ lag(TCEG) + SMGSnP500 + ROA + IFRS
## chisq = 0.54183, df = 1, p-value = 0.4617
## alternative hypothesis: serial correlation in idiosyncratic errors

pbgttest(q2_1modeliii,order = 1)

##
## Breusch-Godfrey/Wooldridge test for serial correlation in panel models
##
## data:  TCEG ~ lag(TCEG) + GDPGrowth:crisisGfc + ROA + IFRS
## chisq = 0.0090727, df = 1, p-value = 0.9241
## alternative hypothesis: serial correlation in idiosyncratic errors

pbgttest(q2_1modeliv,order = 1)

##
## Breusch-Godfrey/Wooldridge test for serial correlation in panel models
##
## data:  TCEG ~ lag(TCEG) + SMGSnP500:crisisGfc + ROA + IFRS
## chisq = 0.0047951, df = 1, p-value = 0.9448
## alternative hypothesis: serial correlation in idiosyncratic errors

```

```
# 2nd part -----

# Models

q2_2modeli <- plm(formula = TierCapGrowth~lag(TierCapGrowth)+GDPGrowth+ROA+IFRS,
                  index = 'bankID',model = 'within',data = data)

q2_2modelii <- plm(formula = TierCapGrowth~lag(TierCapGrowth)+SMGSnP500+ROA+IFRS,
                  index = 'bankID',model = 'within',data = data)

q2_2modeliii <- plm(formula = TierCapGrowth~lag(TierCapGrowth)+GDPGrowth:crisisGfc+ROA+IFRS,
                   index = 'bankID',model = 'within',data = data)

q2_2modeliv <- plm(formula = TierCapGrowth~lag(TierCapGrowth)+SMGSnP500:crisisGfc+ROA+IFRS,
                   index = 'bankID',model = 'within',data = data)

# results

stargazer(q2_2modeli,q2_2modelii,q2_2modeliii,q2_2modeliv, type = 'text',
          omit.summary.stat = 'mean',
          digits = 3)
```

```
##
## =====
##                               Dependent variable:
##                               -----
##                               TierCapGrowth
##                               (1)      (2)      (3)      (4)
## -----
## lag(TierCapGrowth)      -0.214*** -0.204*** -0.200*** -0.202***
##                          (0.037)  (0.038)  (0.038)  (0.037)
##
## GDPGrowth               -1.736***
##                          (0.361)
##
## SMGSnP500                -0.116**
##                          (0.048)
##
## ROA                     3.265**    1.445    0.647    1.542
##                          (1.436)  (1.386)  (1.361)  (1.394)
##
## GDPGrowth:crisisGfc                0.596
##                                      (0.647)
##
## SMGSnP500:crisisGfc                -0.196**
##                                      (0.080)
##
## -----
## Observations              683      683      683      683
## R2                        0.075    0.051    0.043    0.051
```

```
## Adjusted R2          0.035      0.010      0.003      0.010
## F Statistic (df = 3; 654) 17.681*** 11.648*** 9.913*** 11.680***
## =====
## Note:                  *p<0.1; **p<0.05; ***p<0.01
```

```
# serial correlation test
```

```
pbgtest(q2_2modeli,order = 1)
```

```
##
## Breusch-Godfrey/Wooldridge test for serial correlation in panel models
##
## data: TierCapGrowth ~ lag(TierCapGrowth) + GDPGrowth + ROA + IFRS
## chisq = 14.192, df = 1, p-value = 0.0001651
## alternative hypothesis: serial correlation in idiosyncratic errors
```

```
pbgtest(q2_2modelii,order = 1)
```

```
##
## Breusch-Godfrey/Wooldridge test for serial correlation in panel models
##
## data: TierCapGrowth ~ lag(TierCapGrowth) + SMGSnP500 + ROA + IFRS
## chisq = 5.0469, df = 1, p-value = 0.02467
## alternative hypothesis: serial correlation in idiosyncratic errors
```

```
pbgtest(q2_2modeliii,order = 1)
```

```
##
## Breusch-Godfrey/Wooldridge test for serial correlation in panel models
##
## data: TierCapGrowth ~ lag(TierCapGrowth) + GDPGrowth:crisisGfc + ROA + ...
## chisq = 2.2472, df = 1, p-value = 0.1339
## alternative hypothesis: serial correlation in idiosyncratic errors
```

```
pbgtest(q2_2modeliv,order = 1)
```

```
##
## Breusch-Godfrey/Wooldridge test for serial correlation in panel models
##
## data: TierCapGrowth ~ lag(TierCapGrowth) + SMGSnP500:crisisGfc + ROA + ...
## chisq = 4.0768, df = 1, p-value = 0.04348
## alternative hypothesis: serial correlation in idiosyncratic errors
```

```
# Hensen Test is required (to be done)
```

Proposition 3: Impact of bank capitalisation on funding costs

```

# without macroVar -----

q3_1modeli <- plm(formula = FundingCost~lag(FundingCost)+lag(TA_TE)
                  +ROA +factor(IFRS),
                  index = c('bankID','year'),
                  model = 'fd',
                  data = data)

q3_1modelii <- plm(formula = FundingCost~lag(FundingCost)+lag(RWA_TierCap)
                  +ROA+factor(IFRS),
                  index = c('bankID','year'),
                  model = 'fd',data = data)

# 2nd part (with macro variables) -----

q3_2modeli <- plm(formula = FundingCost~lag(FundingCost)+lag(TA_TE)
                  +GDPGrowth+SMGSnP500
                  +ROA +factor(IFRS),
                  index = c('bankID','year'),
                  model = 'fd',
                  data = data)

q3_2modelii <- plm(formula = FundingCost~lag(FundingCost)+lag(RWA_TierCap)
                  +GDPGrowth+SMGSnP500
                  +ROA+factor(IFRS),
                  index = c('bankID','year'),
                  model = 'fd',data = data)

q3_2modeliii <- plm(formula = FundingCost~lag(FundingCost)+lag((TCE/TA)*100)
                  +GDPGrowth+SMGSnP500
                  +ROA+factor(IFRS),
                  index = c('bankID','year'),
                  model = 'fd',data = data)

stargazer(q3_1modeli, q3_1modelii, q3_2modeli, q3_2modelii, q3_2modeliii,
          type = 'text',
          omit.summary.stat = 'mean',
          digits = 3)

```

```

##
## =====
##                                     Dependent variable:
## -----
##                                     FundingCost
##                                     (3)
## (1) (2) (3) (4)
## -----
## lag(FundingCost) -0.076** -0.069* -0.074* -0.070*
##                  (0.039) (0.039) (0.039) (0.039)
##
## lag(TA_TE) -0.005 -0.013
##             (0.018) (0.018)

```

```
##
## lag(RWA_TierCap)                0.057                0.041
##                               (0.040)                (0.040)
##
## lag((TCE/TA) * 100)
##
##
## GDPGrowth                        0.013                0.013
##                               (0.026)                (0.026)
##
## SMGSp500                       -0.012***             -0.011**
##                               (0.004)                (0.004)
##
## ROA                            0.140                0.151                0.238**             0.238**
##                               (0.108)                (0.108)                (0.114)                (0.114)
##
## Constant                       -0.062                -0.053                -0.067                -0.059
##                               (0.053)                (0.053)                (0.052)                (0.053)
##
## -----
## Observations                    655                    655                    655                    655
## R2                             0.009                    0.012                    0.024                    0.025
## Adjusted R2                    0.005                    0.008                    0.017                    0.017
## F Statistic                    2.037 (df = 3; 651) 2.692** (df = 3; 651) 3.217*** (df = 5; 649) 3.320*** (df = 5; 649)
## =====
## Note:
```

```
pbgttest(q3_1modeli,order = 1)
```

```
##
## Breusch-Godfrey/Wooldridge test for serial correlation in panel models
##
## data: FundingCost ~ lag(FundingCost) + lag(TA_TE) + ROA + factor(IFRS)
## chisq = 79.673, df = 1, p-value < 2.2e-16
## alternative hypothesis: serial correlation in idiosyncratic errors
```

```
pbgttest(q3_1modelii,order = 1)
```

```
##
## Breusch-Godfrey/Wooldridge test for serial correlation in panel models
##
## data: FundingCost ~ lag(FundingCost) + lag(RWA_TierCap) + ROA + factor(IFRS)
## chisq = 77.519, df = 1, p-value < 2.2e-16
## alternative hypothesis: serial correlation in idiosyncratic errors
```

```
pbgttest(q3_2modeli,order = 1)
```

```
##
## Breusch-Godfrey/Wooldridge test for serial correlation in panel models
##
## data: FundingCost ~ lag(FundingCost) + lag(TA_TE) + GDPGrowth + SMGSp500 + ...
## chisq = 71.897, df = 1, p-value < 2.2e-16
## alternative hypothesis: serial correlation in idiosyncratic errors
```

```
pbgttest(q3_2modelii,order = 1)
```

```
##  
## Breusch-Godfrey/Wooldridge test for serial correlation in panel models  
##  
## data: FundingCost ~ lag(FundingCost) + lag(RWA_TierCap) + GDPGrowth + ...  
## chisq = 71.357, df = 1, p-value < 2.2e-16  
## alternative hypothesis: serial correlation in idiosyncratic errors
```

```
pbgttest(q3_2modeliii,order = 1)
```

```
##  
## Breusch-Godfrey/Wooldridge test for serial correlation in panel models  
##  
## data: FundingCost ~ lag(FundingCost) + lag((TCE/TA) * 100) + GDPGrowth + ...  
## chisq = 67.99, df = 1, p-value < 2.2e-16  
## alternative hypothesis: serial correlation in idiosyncratic errors
```

Proposition 4: Do less leveraged banks get more funding?

```
# without macroVar -----  
  
q4_1modeli <- plm(formula = TFundGrow~lag(TFundGrow)+lag(TA_TE)+ROA+factor(IFRS),  
  index = c('bankID','year'),  
  model = 'within',  
  data = data)  
q4_1modelii <- plm(formula = TFundGrow~lag(TFundGrow)+lag(RWA_TierCap)+ROA+factor(IFRS),  
  index = c('bankID','year'),  
  model = 'within',  
  data = data)  
  
# 2nd part (with macro variables) -----  
  
q4_2modeli <- plm(formula = TFundGrow~lag(TFundGrow)+lag(TA_TE)  
  +GDPGrowth+SMGSP500+ROA+factor(IFRS),  
  index = c('bankID','year'),  
  model = 'within',  
  data = data)  
q4_2modelii <- plm(formula = TFundGrow~lag(TFundGrow)+lag(RWA_TierCap)  
  +GDPGrowth+SMGSP500+ROA+factor(IFRS),  
  index = c('bankID','year'),  
  model = 'fd',data = data)  
  
stargazer(q4_1modeli, q4_1modelii, q4_2modeli, q4_2modelii,  
  type = 'text',  
  omit.summary.stat = 'mean',  
  digits = 3)
```

```
##
## =====
##                               Dependent variable:
##                               -----
##                               TFundGrow
##                               (1)           (2)           (3)           (4)
## -----
## lag(TFundGrow)      0.084**           0.043           0.093**           -0.395
##                     (0.039)           (0.039)           (0.039)           (0.039)
##
## lag(TA_TE)          0.031           0.010
##                     (0.146)           (0.149)
##
## lag(RWA_TierCap)    1.560***           0.74
##                     (0.293)           (0.56)
##
## GDPGrowth          -1.180***           -1.497
##                     (0.429)           (0.37)
##
## SMGSnP500          0.030           0.196*
##                     (0.058)           (0.06)
##
## ROA                 5.545***           4.935***           7.096***           2.40
##                     (1.300)           (1.278)           (1.393)           (1.60)
##
## Constant           -0.51
##                     (0.74)
## -----
## Observations        681           681           681           655
## R2                  0.036           0.076           0.049           0.19
## Adjusted R2         -0.006           0.036           0.005           0.18
## F Statistic         8.023*** (df = 3; 652) 17.833*** (df = 3; 652) 6.716*** (df = 5; 650) 31.232*** (df
## =====
## Note:                                                         *p<0.1; **p<0.05;
```

```
pbgttest(q4_1modeli,order = 1)
```

```
##
## Breusch-Godfrey/Wooldridge test for serial correlation in panel models
##
## data: TFundGrow ~ lag(TFundGrow) + lag(TA_TE) + ROA + factor(IFRS)
## chisq = 1.3239, df = 1, p-value = 0.2499
## alternative hypothesis: serial correlation in idiosyncratic errors
```

```
pbgttest(q4_1modelii,order = 1)
```

```
##
## Breusch-Godfrey/Wooldridge test for serial correlation in panel models
##
## data: TFundGrow ~ lag(TFundGrow) + lag(RWA_TierCap) + ROA + factor(IFRS)
## chisq = 1.4715, df = 1, p-value = 0.2251
## alternative hypothesis: serial correlation in idiosyncratic errors
```



```
pbgttest(q4_2modeli,order = 1)
```

```
##
## Breusch-Godfrey/Wooldridge test for serial correlation in panel models
##
## data:  TFundGrow ~ lag(TFundGrow) + lag(TA_TE) + GDPGrowth + SMGSnP500 + ...
## chisq = 1.0095, df = 1, p-value = 0.315
## alternative hypothesis: serial correlation in idiosyncratic errors
```

```
pbgttest(q4_2modelii,order = 1)
```

```
##
## Breusch-Godfrey/Wooldridge test for serial correlation in panel models
##
## data:  TFundGrow ~ lag(TFundGrow) + lag(RWA_TierCap) + GDPGrowth + SMGSnP500 + ...
## chisq = 90.914, df = 1, p-value < 2.2e-16
## alternative hypothesis: serial correlation in idiosyncratic errors
```

Proposition 5: Do less leveraged banks supply more credit?

```
# without macroVar -----

q5_1modeli <- plm(formula = LG~lag(LG)+lag(TA_TE)+ROA+factor(IFRS),
                  index = c('bankID','year'),
                  model = 'within',
                  data = data)
q5_1modelii <- plm(formula = LG~lag(LG)+lag(RWA_TierCap)+ROA+factor(IFRS),
                  index = c('bankID','year'),
                  model = 'within',
                  data = data)

# 2nd part (with macro variables) -----

q5_2modeli <- plm(formula = LG~lag(LG)+lag(TA_TE)+ROA+factor(IFRS)
                  +GDPGrowth+SMGSnP500,
                  index = c('bankID','year'),
                  model = 'within',
                  data = data)

q5_2modelii <- plm(formula = LG~lag(LG)+lag(RWA_TierCap)+ROA+factor(IFRS)
                  +GDPGrowth+SMGSnP500,
                  index = c('bankID','year'),
                  model = 'fd',data = data)

stargazer(q5_1modeli, q5_1modelii, q5_2modeli, q5_2modelii,
          type = 'text',
          omit.summary.stat = 'mean',
          digits = 3)
```

```
##
## =====
##                               Dependent variable:
##                               -----
##                               LG
##                               (1)          (2)          (3)          (4)
## -----
## lag(LG)                0.029          0.020          0.031          -0.456
##                        (0.036)        (0.037)        (0.036)        (0.036)
##
## lag(TA_TE)             0.545***          0.524***
##                        (0.156)          (0.160)
##
## lag(RWA_TierCap)                0.968***          0.04
##                        (0.324)          (0.62)
##
## ROA                    5.604***          5.259***          4.943***          -1.17
##                        (1.404)        (1.412)        (1.517)        (1.74)
##
## GDPGrowth                                0.693          0.37
##                                (0.463)        (0.40)
##
## SMGSnP500                                -0.058          -0.01
##                                (0.062)        (0.06)
##
## Constant                                -0.32
##                                (0.81)
## -----
## Observations                681          681          681          655
## R2                        0.044          0.040          0.048          0.23
## Adjusted R2                0.003          -0.001          0.004          0.22
## F Statistic      10.121*** (df = 3; 652) 9.021*** (df = 3; 652) 6.524*** (df = 5; 650) 38.720*** (df
## =====
## Note:                                *p<0.1; **p<0.05;
```

```
pbgttest(q5_1modeli,order = 1)
```

```
##
## Breusch-Godfrey/Wooldridge test for serial correlation in panel models
##
## data: LG ~ lag(LG) + lag(TA_TE) + ROA + factor(IFRS)
## chisq = 3.8547, df = 1, p-value = 0.04961
## alternative hypothesis: serial correlation in idiosyncratic errors
```

```
pbgttest(q5_1modelii,order = 1)
```

```
##
## Breusch-Godfrey/Wooldridge test for serial correlation in panel models
##
## data: LG ~ lag(LG) + lag(RWA_TierCap) + ROA + factor(IFRS)
## chisq = 4.6812, df = 1, p-value = 0.03049
## alternative hypothesis: serial correlation in idiosyncratic errors
```

```
pbgttest(q5_2modeli,order = 1)
```

```
##  
## Breusch-Godfrey/Wooldridge test for serial correlation in panel models  
##  
## data: LG ~ lag(LG) + lag(TA_TE) + ROA + factor(IFRS) + GDPGrowth + ...  
## chisq = 3.5309, df = 1, p-value = 0.06023  
## alternative hypothesis: serial correlation in idiosyncratic errors
```

```
pbgttest(q5_2modelii,order = 1)
```

```
##  
## Breusch-Godfrey/Wooldridge test for serial correlation in panel models  
##  
## data: LG ~ lag(LG) + lag(RWA_TierCap) + ROA + factor(IFRS) + GDPGrowth + ...  
## chisq = 60.863, df = 1, p-value = 6.119e-15  
## alternative hypothesis: serial correlation in idiosyncratic errors
```

Proposition: 07: The effect of bank capital in the monetary transmission mechanism

```
# without macroVar -----  
  
q6_1modeli <- plm(formula = LG~lag(LG)+lag(TA_TE)+(lag(TA_TE)*MPGrowth),  
                  index = c('bankID','year'),  
                  model = 'within',  
                  data = data)  
q6_1modelii <- plm(formula = LG~lag(LG)+lag(RWA_TierCap)+(lag(RWA_TierCap)*MPGrowth),  
                   index = c('bankID','year'),  
                   model = 'within',  
                   data = data)  
  
# 2nd part (with macro variables) -----  
  
q6_2modeli <- plm(formula = LG~lag(LG)+lag(TA_TE)+(lag(TA_TE)*MPGrowth)+  
                  ROA+factor(IFRS)+  
                  GDPGrowth+SMGSnP500,  
                  index = c('bankID','year'),  
                  model = 'within',  
                  data = data)  
  
q6_2modelii <- plm(formula = LG~lag(LG)+lag(RWA_TierCap)+(lag(RWA_TierCap)*MPGrowth)+  
                   ROA+factor(IFRS)  
                   +GDPGrowth+SMGSnP500,  
                   index = c('bankID','year'),  
                   model = 'within',data = data)  
  
stargazer(q6_1modeli, q6_1modelii, q6_2modeli, q6_2modelii,  
          type = 'text',  
          omit.summary.stat = 'mean',  
          digits = 3)
```

```

##
## =====
##                                     Dependent variable:
##                                     -----
##                                     LG
##                                     (1)          (2)          (3)
## -----
## lag(LG)                0.038          0.028          0.033
##                        (0.036)        (0.037)        (0.036)
##
## lag(TA_TE)             0.473***
##                        (0.177)
##
## lag(RWA_TierCap)       1.147***
##                        (0.327)
##
## MPGrowth               0.044**        -0.015          0.042**
##                        (0.020)        (0.035)        (0.020)
##
## ROA                    4.770***
##                        (1.517)
##
## GDPGrowth              0.617
##                        (0.483)
##
## SMGSnP500              -0.040
##                        (0.064)
##
## lag(TA_TE):MPGrowth    -0.002
##                        (0.001)
##
## lag(RWA_TierCap):MPGrowth 0.004
##                        (0.005)
##
## -----
## Observations           681          681          681
## R2                     0.031        0.026        0.054
## Adjusted R2            -0.012       -0.017        0.008
## F Statistic            5.175*** (df = 4; 651) 4.341*** (df = 4; 651) 5.326*** (df = 7; 648) 4.303
## =====
## Note:

```

*p<0.1; **p<0.05; ***p<0.01

```

pbgttest(q6_1modeli,order = 1)

```

```

##
## Breusch-Godfrey/Wooldridge test for serial correlation in panel models
##
## data: LG ~ lag(LG) + lag(TA_TE) + (lag(TA_TE) * MPGrowth)
## chisq = 0.46336, df = 1, p-value = 0.4961
## alternative hypothesis: serial correlation in idiosyncratic errors

```

```

pbgttest(q6_1modelii,order = 1)

```

```
##
## Breusch-Godfrey/Wooldridge test for serial correlation in panel models
##
## data: LG ~ lag(LG) + lag(RWA_TierCap) + (lag(RWA_TierCap) * MPGrowth)
## chisq = 0.82127, df = 1, p-value = 0.3648
## alternative hypothesis: serial correlation in idiosyncratic errors
```

```
pbgtest(q6_2modeli,order = 1)
```

```
##
## Breusch-Godfrey/Wooldridge test for serial correlation in panel models
##
## data: LG ~ lag(LG) + lag(TA_TE) + (lag(TA_TE) * MPGrowth) + ROA + factor(IFRS) + ...
## chisq = 3.9194, df = 1, p-value = 0.04773
## alternative hypothesis: serial correlation in idiosyncratic errors
```

```
pbgtest(q6_2modelii,order = 1)
```

```
##
## Breusch-Godfrey/Wooldridge test for serial correlation in panel models
##
## data: LG ~ lag(LG) + lag(RWA_TierCap) + (lag(RWA_TierCap) * MPGrowth) + ...
## chisq = 3.9799, df = 1, p-value = 0.04605
## alternative hypothesis: serial correlation in idiosyncratic errors
```