Exercise on Prudential Policies: Identification of credit supply shocks

The Central Bank asks you to revise the implications for bank lending of a regulation adopted at the end of March 2007. At that time, the Central Bank allowed *large* banks to adopt risk-weights on their assets based on internal (i.e. in-house built) rating models, also known as internal rating based (IRB) approach. The remaining *smaller* banks had to follow the Standardized Approach (SA), with risk-weights provided by the Cental Bank.

There are concerns within the Central Bank that such policy triggered a decrease in capital buffers and spurred risk-taking by such large banks, de facto relaxing the macroprudential stance. Your task is to conduct a rigorous microeconometric analysis to inform the Board about whether such concerns are empirically grounded. The period of analysis goes from 2006q1 to 2008q2.

1. The Central Bank adopts a rule such that very large banks only can (risk)-weight their assets through IRB-models. In particular, banks in the top-quartile of the Total Assets (non risk-weighted) distribution as of 2007q1 can adopt IRB models, whereas smaller banks keep using the standard risk-weights provided by the Central Bank. **Investigate bank balance-sheet data and show whether IRB-banks use internal models to reduce capital holdings. You should use both statistical and graphical tools.** *Hint:* Banks may use IRB to reduce the size of risk-weighted assets. You are given information on the Tier-1 Capital Ratio (over Risk-Weighted Assets). However, the Basel III leverage ratio (Tier-1 Capital over Total Assets) may better track capital holdings.

   - *Study the distribution of bank total assets as of 2007q1 through the command* **summarize**
   - *Label banks with total assets above the 2007q1's 75th percentale as* IRB.
   - *Obtain the leverage ratio and compare its evolution over time across treated and untreated banks*
     - *You can produce either a table with summary statistics across IRB and SA banks, before and after the shocks, and/or a chart showing the evolution of the mean Tier-1 Ratio and Leverage Ratio for IRB and SA banks over time*

2. **Does IRB regulation affect credit supply on average? Provide evidence on the robustness of your findings and try to quantify the effects.** *Hint 1:* on robustness, check the validity of your identifying assumption as best you can and also the non-significant role of outliers in shaping your findings.

   - *First, estimate a diff-in-diff model. You might want to use the command* **reghdfe**. *It works as*: reghdfe y X, absorb(FE1 FE2 FE3…) vce(cluster C1 C2….). Note: y is the depedent variable, X your set of covariates. The variables you insert into "absorb" are the fixed effects you want to use. Note: you may use multiple fixed effects. Also, you can use multiple cluster groups C1, C2,…for the estimation of the Var-Covar variance

   - *Robustness Exercises*

- Typically, you want to check stability of coefficients in different versions of the model
- In diff-in-diff exercise, Parallel trend assumption is key. Typically, this is studied looking at the evolution of the treatment effect over time (instead of looking at the simple post*treatment coefficient)
  - In Stata, you may want to plot the coefficients through the command **coefplot**
- You can also run a placebo test. For instance, would any effect show up if you were to assign a "fake" treatment earlier in the sample?

Practical suggestion

You can run this exercise with the program you are most familiar with.

If you use Stata, you might find useful to use the command **reghdfe.**

If not installed in your Stata, please run:

- **ssc install reghdfe**

This command is useful for estimating regressions (reg) based on high-dimensional fixed effects (hdfe).

It works as follows. Assume you want to estimate a regression of **y** over the vector of coverties **X,** while controlling for different fixed-effects dummies **F1**, **F2**,….,**Fj.** Interestingly, this command also allows for multi-way clustering, say over cluster-groups **C1, C2, …,Ck.**

Then you can simply run:

- **reghdfe y X, absorb(F1 F2 …. Fj) vce(cluster C1 C2 …. Ck)**

Note: using alternative programs for fixed effects estimation (xtreg, areg) might lead to very slow estimations when N is a large and the fixed-effects vectors contain a large number of dummies.

Description of the data

Variable	Definition	Scale/Format
Identifiers		
firmid	unique firm identifier	number
bankid	unique bank identifier	number
date_q	Current date	Quarterly date
Loan-level data		
lncredit	Outstanding credit granted by bank "b" to firm "f"	Logs
intrate	Average interest rate on credit granted by bank "b" to firm "f"	% (1=1%)
coll_share	Value of Collateral / Credit	% (1=1%)
Bank-level data		
bdepo	bank deposits	% of Total Assets
bcet1	common equity tier-1 capital	% of Risk-Weighted Assets
bsizerw	Risk-Weighted Assets	Logs
bsize	Total (Non risk-weighted) Assets	Logs
Firm level data		
rating	Proxies of firm risk	Rating=1 → Low risk Rating = 2 → Low-medium risk Rating = 3 → High-medium risk Rating = 4 → high risk
empl	Firm employment	Number of employees
fsize	Firm total assets	Logs