

Deposit Insurance and Banks' Deposit Rates: Evidence From a EU Policy

Matteo Gatti[†]

Tommaso Oliviero[‡]

[†]EUI

[‡]University of Naples and CEF

May 1, 2017

Motivation

- ▶ In 2009 EU **raised** deposit insurance limit to €100,000
 - ▶ Deposits account for around **40%** of total EU banks' funds
 - ▶ Previous limit was €20,000 but it varied across EU
 - ▶ *Goal:* Reduce riskiness of bank-runs in Financial Crisis
- ▶ In the aftermath of the crisis policymakers need to understand its implications on the banking system
 - ▶ Do banks pass through deposit insurance costs to depositors?
 - ▶ Do depositors monitor banks less?
- ▶ Important step towards an integrated Banking Union

Deposit Insurance Benefits (and Costs)

- ▶ Deposit Insurance **protects depositors**, from bank's inability to pay its debts when due
- ▶ Theory on Deposit Insurance
 - ▶ Kills the run equilibrium (no cost) Diamond Dybvig (1983)
 - ▶ Lowers run prob (pecuniary externality) Davila et. al (2017)
 - ▶ Induces moral hazard (risk shifting) Cooper Ross (2002)
- ▶ (Little) Empirical Evidence
 - ▶ Greater risk taking Lambert et. al (2017)
 - ▶ Greater likelihood of financial crisis Demigurt-Kunt et. al (2002)

This Paper

- ▶ Exploits the exogenous variation introduced by the 2009 increase in deposit insurance limit on EU banks
- ▶ Studies *empirically* the **costs** associated to higher deposit insurance limits
 - ▶ Pass through of DI costs
 - ▶ Lower depositors' monitoring
- ▶ Focuses on *deposit rates* paid by banks to depositors
- ▶ Runs a *diff-in-diff* to estimate the causal effect of deposit insurance on deposit rates

Preview of Findings

- ▶ *Cross-Country analysis*: when DI limits increase, banks
 - ▶ Decrease deposit rates
 - ▶ Do not increase total deposits

What's new? Banks pass through higher costs to depositors and depositors perceive deposits as safer assets

- ▶ *Bank-level analysis*: when DI limits increase
 - ▶ Banks decrease deposit rates
 - ▶ Riskier banks decrease deposit rates more

What's new? Riskier banks pay lower rates as depositors *no longer monitor* them

SETTING AND DATA

March 2009: EU Increases Deposit Insurance Limit (DIL)

- ▶ 2009/14/EC Directive increases DIL to €100,000
 - ▶ Previous limit was set to €20,000 by 94/19/EC Directive
 - ▶ Some EU countries increased the €20,000 limit
 - ▶ Deposit Insurance Funds were not adequate
- ▶ With the Financial Crisis in Fall 2008
 - ▶ Rat race across EU countries to increase the limit
 - ▶ Some government impose blanket guarantees
 - ▶ In Oct 2008 Ecofin increased DIL to €50,000
- ▶ Italy already had a €103,291 limit from 1994

Deposit Insurance Limits

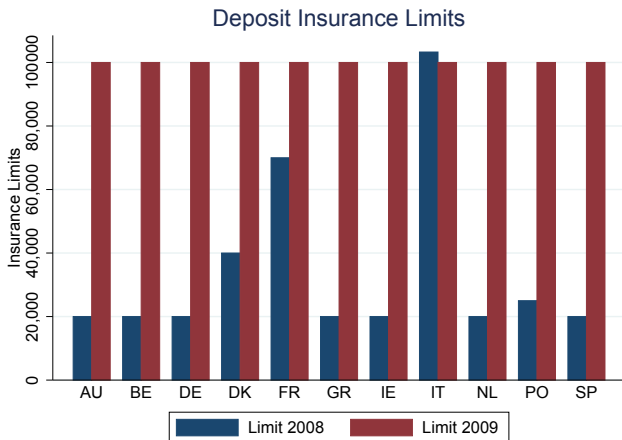


Figure: Deposit Insurance Limits - Euro Countries

Data Sources

- ▶ Banks' data from 2006 to 2015
 - ▶ Standard balance-sheet characteristics (Bankscope)
 - ▶ Detailed composition of funding Total Deposits, Deposit expenses (both as rates and abs value)
- ▶ Deposit Insurance
 - ▶ Deposit Insurance dataset (World Bank)
 - ▶ JRC report on covered and eligible deposits - 2007 only
 - ▶ National deposit insurance institutions
- ▶ Macroeconomic variables
 - ▶ Public debt/GDP, GDP growth etc.. OECD dataset

EMPIRICAL STRATEGY

Two Empirical Challenges

1. Increase in DIL is not randomly assigned to countries
2. Italian banks are the only control group

Two Empirical Challenges

1. Increase in DIL is not randomly assigned to countries
 - ▶ We run a *diff-in-diff* on cross-country aggregated data
2. Italian banks are the only control group

Two Empirical Challenges

1. Increase in DIL is not randomly assigned to countries
 - ▶ We run a *diff-in-diff* on cross-country aggregated data
2. Italian banks are the only control group
 - ▶ We run a diff-in-diff on granulated data to exploit within-banks variation

Two Empirical Challenges

1. Increase in DIL is not randomly assigned to countries
 - ▶ We run a *diff-in-diff* on cross-country aggregated data
2. Italian banks are the only control group
 - ▶ We run a diff-in-diff on granulated data to exploit within-banks variation
 - ▶ Perform a *propensity score matching* to improve the quality of the treated group as in Lambert et al (2017)

Deposit Rates - Italy vs Average Treated

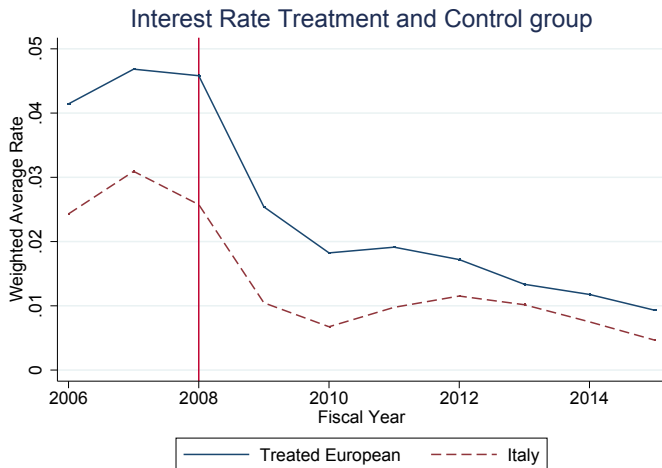


Figure: Deposit Rates - Treated Group and Italy

Cross-Country Summary Statistics

Table: Aggregated Data - Summary Statistics 2006-2008

	(1)	(2)
	Treated	Non-Treated
	mean	mean
Weighted deposit interest rate	0.0443	0.0277
Growth rate Total deposits	0.0873	0.0963
Growth rate real GDP	0.0221	0.0225
Unemployment rate	6.8994	6.5250
Public debt over GDP	60.0995	102.6700
Covered to eligible ratio	0.5445	0.7337
Ratio of deposits by top 5 institutions	0.8372	0.7449
Ratio of deposits by top 20 institutions	0.9900	0.9500
Herfindal index	2218.1490	1918.3833
Observations	30	3

Cross-Country Summary Statistics

Table: Aggregated Data - Summary Statistics 2006-2008

	(1)	(2)
	Treated	Non-Treated
	mean	mean
Weighted deposit interest rate	0.0443	0.0277
Growth rate Total deposits	0.0873	0.0963
Growth rate real GDP	0.0221	0.0225
Unemployment rate	6.8994	6.5250
Public debt over GDP	60.0995	102.6700
Covered to eligible ratio	0.5445	0.7337
Ratio of deposits by top 5 institutions	0.8372	0.7449
Ratio of deposits by top 20 institutions	0.9900	0.9500
Herfindal index	2218.1490	1918.3833
Observations	30	3

Cross-Country Summary Statistics

Table: Aggregated Data - Summary Statistics 2006-2008

	(1)	(2)
	Treated	Non-Treated
	mean	mean
Weighted deposit interest rate	0.0443	0.0277
Growth rate Total deposits	0.0873	0.0963
Growth rate real GDP	0.0221	0.0225
Unemployment rate	6.8994	6.5250
Public debt over GDP	60.0995	102.6700
Covered to eligible ratio	0.5445	0.7337
Ratio of deposits by top 5 institutions	0.8372	0.7449
Ratio of deposits by top 20 institutions	0.9900	0.9500
Herfindal index	2218.1490	1918.3833
Observations	30	3

⇒ Need to check for cross-country heterogeneity

MAIN RESULTS

Outline of Results

- ▶ **Cross-Country analysis:** when DI limit increases, banks
 - ▶ *Decrease* deposit rates
 - ▶ the *greater* the amount of uncovered deposits before the increase
 - ▶ the *lower* the debt-to-GDP ratio
 - ▶ Total deposits only increase for low levels of Public Debt/GDP
- ▶ **Bank-Level analysis:** when DI limit increases, banks
 - ▶ *Decrease* deposit rates
 - ▶ *Riskier* banks decrease deposit rates more
 - ▶ Riskier banks no longer need to compete for deposits with safer banks and can reduce deposit rates more
 - ▶ We consider *liquidity risk* measured with credit lines

Cross-Country Baseline

$$\textit{WeightedRates}_{ct} = \gamma_c + \lambda_t + \delta(T_c \cdot \textit{post}_t) + \epsilon_{ct}$$

- ▶ Observation at the (c, t) country-period level

Cross-Country Baseline

$$\textit{WeightedRates}_{ct} = \gamma_c + \lambda_t + \delta(T_c \cdot \textit{post}_t) + \epsilon_{ct}$$

- ▶ Observation at the (c, t) country-period level
- ▶ $\textit{WeightedRates}_{ct}$: Average Deposit Rates in country c at time t weighted by total deposits

Cross-Country Baseline

$$WeightedRates_{ct} = \gamma_c + \lambda_t + \delta(T_c \cdot post_t) + \epsilon_{ct}$$

- ▶ Observation at the (c, t) country-period level
- ▶ $WeightedRates_{ct}$: Average Deposit Rates in country c at time t weighted by total deposits
- ▶ T_c dummy variable equals 1 if increase in insurance limit

Cross-Country Baseline

$$WeightedRates_{ct} = \gamma_c + \lambda_t + \delta(T_c \cdot post_t) + \epsilon_{ct}$$

- ▶ Observation at the (c, t) country-period level
- ▶ $WeightedRates_{ct}$: Average Deposit Rates in country c at time t weighted by total deposits
- ▶ T_c dummy variable equals 1 if increase in insurance limit
- ▶ $post_t$ dummy variable if $year \geq 2009$

Cross-Country Baseline

$$\textit{WeightedRates}_{ct} = \gamma_c + \lambda_t + \delta(T_c \cdot \textit{post}_t) + \epsilon_{ct}$$

- ▶ Observation at the (c, t) country-period level
- ▶ $\textit{WeightedRates}_{ct}$: Average Deposit Rates in country c at time t weighted by total deposits
- ▶ T_c dummy variable equals 1 if increase in insurance limit
- ▶ \textit{post}_t dummy variable if $\textit{year} \geq 2009$
- ▶ Fixed effects γ_c and time effects λ_t

Baseline Results

$$\text{WeightedRates}_{ct} = \gamma_c + \lambda_t + \delta(T_c \cdot \text{post}_t) + \epsilon_{ct}$$

Table: Cross Country Analysis - Robustness

Panel A	Weighted Deposit Rates		
	(1)	(2)	(3)
<i>T · post</i>	-0.0075*** (0.0023)		
Year Dummies	✓		
Fixed Effects	✓		
Excluding France			
No Sovereign Crisis (years)			
Observations	110	100	55
Adjusted R^2	0.854	0.849	0.848

Baseline Results

$$\text{WeightedRates}_{ct} = \gamma_c + \lambda_t + \delta(T_c \cdot \text{post}_t) + \epsilon_{ct}$$

Table: Cross Country Analysis - Robustness

Panel A	Weighted Deposit Rates		
	(1)	(2)	(3)
<i>T · post</i>	-0.0075*** (0.0023)	-0.0079** (0.0025)	
Year Dummies	✓	✓	
Fixed Effects	✓	✓	
Excluding France		✓	
No Sovereign Crisis (years)			
Observations	110	100	55
Adjusted R ²	0.854	0.849	0.848

Baseline Results

$$\text{WeightedRates}_{ct} = \gamma_c + \lambda_t + \delta(T_c \cdot \text{post}_t) + \epsilon_{ct}$$

Table: Cross Country Analysis - Robustness

Panel A	Weighted Deposit Rates		
	(1)	(2)	(3)
<i>T · post</i>	-0.0075*** (0.0023)	-0.0079** (0.0025)	-0.0042* (0.0017)
Year Dummies	✓	✓	✓
Fixed Effects	✓	✓	✓
Excluding France		✓	
No Sovereign Crisis (years)			✓
Observations	110	100	55
Adjusted R ²	0.854	0.849	0.848

Cross-Country Heterogeneity

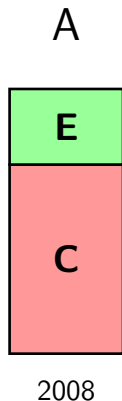
- ▶ What countries drive our results?


$$WeightedRates_{ct} = \gamma_c + \lambda_t + \delta(T_c^{H_c} \cdot post_t) + \epsilon_{ct}$$

- ▶ Sample splitting
 1. $H_c \Rightarrow$ Cover to Eligible Ratio CtE_c
 2. $H_c \Rightarrow$ Public Debt to GdP Ratio pd_c
- ▶ We always use *Italy* as a control country

Eligible and Covered Deposits

Bank deposits in country A with €20,000 Limit

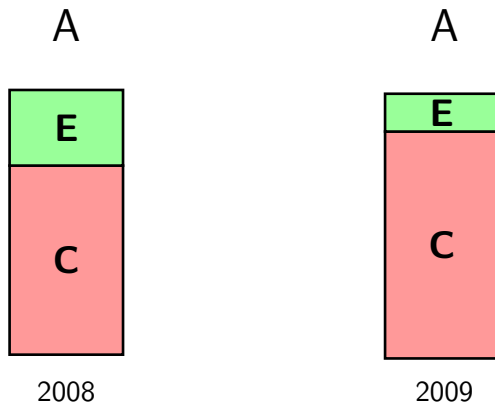


 Eligible Deposits

 Covered Deposits

Eligible and Covered Deposits

Bank deposits in country A with €100,000 Limit



 Eligible Deposits

 Covered Deposits

Exposure to Increase in Deposit Insurance

$$CtE_c = \frac{CoveredDeposits_c}{EligibleDeposits_c} \in [0, 1]$$

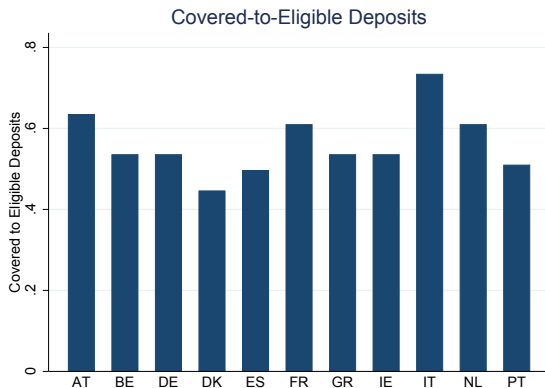


Figure: Total Covered Deposits over Eligible Deposits - JRC Data

Cross-Country Heterogeneity: CtE Ratio

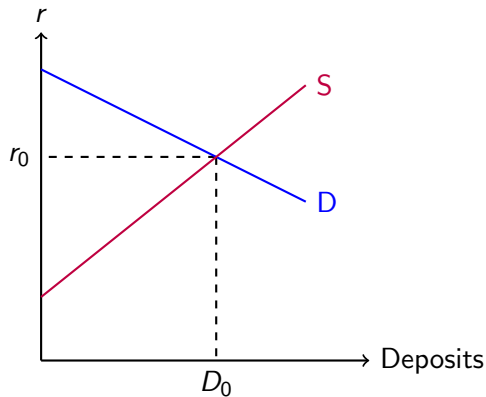
$$\text{WeightedRates}_{ct} = \gamma_c + \lambda_t + \delta(T_c^{H_c} \cdot \text{post}_t) + \epsilon_{ct}$$

$$H_c = \mathbb{1}_{\text{CtE}_c \leq p50(\text{CtE})}$$

Panel A	$H_c = 1$		$H_c = 0$	
	(1) Deposit Rates	(2) Log Tot Deposits	(3) Deposit Rates	(4) Log Tot Deposits
$T \cdot H_c \cdot \text{post}$	-0.0084** (0.0025)	0.0353 (0.1147)	-0.0075 (0.0061)	0.1106 (0.0950)
Year Dummies	✓	✓	✓	✓
Country Fixed Effects	✓	✓	✓	✓
Observations	80	80	40	40
Adjusted R^2	0.8428	0.9584	0.9155	0.9907

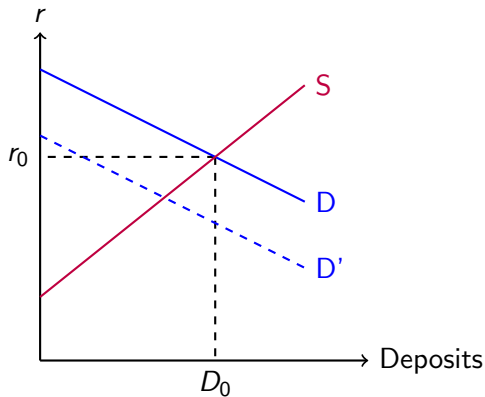
Cover to Eligible

- ▶ Banks decrease deposit rates in countries with *lower* levels of covered deposits in the pre-period
 - ▶ Banks pass through higher DI costs to depositors
 - ▶ No effect on total deposits



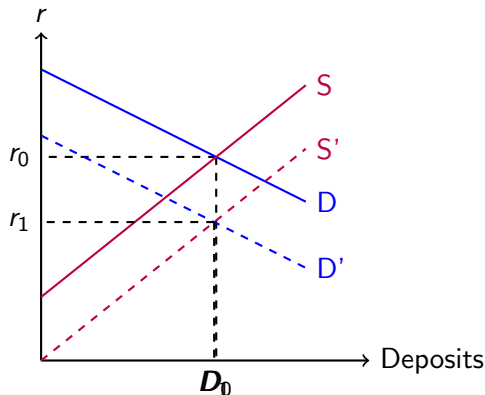
Cover to Eligible

- ▶ Banks decrease deposit rates in countries with *lower* levels of covered deposits in the pre-period
 - ▶ Banks pass through higher DI costs to depositors
 - ▶ No effect on total deposits



Cover to Eligible

- ▶ Banks decrease deposit rates in countries with *lower* levels of covered deposits in the pre-period
 - ▶ Banks pass through higher DI costs to depositors
 - ▶ No effect on total deposits



Cross-Country Heterogeneity: Debt-to-GDP

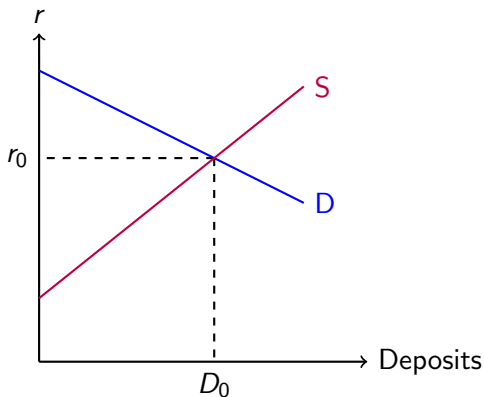
$$\text{WeightedRates}_{ct} = \gamma_c + \lambda_t + \delta(T_c^{H_c} \cdot \text{post}_t) + \epsilon_{ct}$$

$$H_c = \mathbb{1}_{pd_c \leq p50(pd)}$$

Panel A	$H_c = 1$		$H_c = 0$	
	(1) Deposit Rates	(2) Log Tot Deposits	(3) Deposit Rates	(4) Log Tot Deposits
$T \cdot H_c \cdot \text{post}$	-0.0097** (0.0030)	0.1865** (0.0811)	-0.0058 (0.0041)	0.1350 (0.1283)
Year Dummies	✓	✓	✓	✓
Country Fixed Effects	✓	✓	✓	✓
Observations	70	70	50	50
Adjusted R^2	0.9152	0.9881	0.9155	0.9881

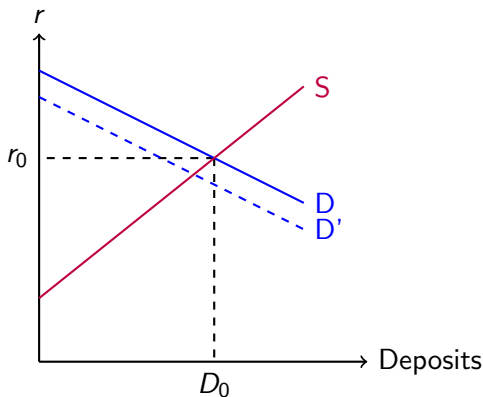
Debt to GDP

- ▶ Banks decrease deposit rates in countries with *lower* levels of Public Debt/GDP
 - ▶ Depositors perceive DI as credible if government has greater spending capacity
 - ▶ Increase in supply is stronger than pass-through of higher costs



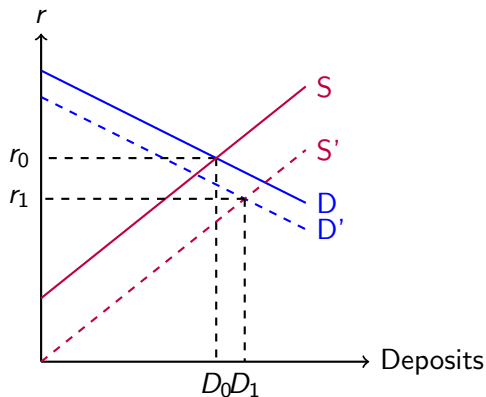
Debt to GDP

- ▶ Banks decrease deposit rates in countries with *lower* levels of Public Debt/GDP
 - ▶ Depositors perceive DI as credible if government has greater spending capacity
 - ▶ Increase in supply is stronger than pass-through of higher costs



Debt to GDP

- ▶ Banks decrease deposit rates in countries with *lower* levels of Public Debt/GDP
 - ▶ Depositors perceive DI as credible if government has greater spending capacity
 - ▶ Increase in supply is stronger than pass-through of higher costs



Bank-Level Analysis

- ▶ Does cross-country analysis capture all the effects?
 - ▶ Granulated data allows us to exploit within-bank variation
 - ▶ Propensity score matching restricts treated banks to more comparable banks
 - ▶ Explore banks' behaviour with risk

Bank-Level Summary Statistics

Table: Summary Statistics

	(1)	(2)
	Treatment	Control
	mean	mean
Total Assets	20.93	6.50
Total deposit over Total Assets	0.62	0.52
Tier 1 capital over Total Assets	0.08	0.11
Net Loans over Total Assets	0.58	0.66
Impaired Loans over Total Assets	0.02	0.04
Government Bonds over Total Assets	0.03	0.12
Committed Credit Lines	0.10	0.05
ROA	0.45	0.86
ROE	5.79	7.86
Observations	3982	1397

Bank-Level Summary Statistics

Table: Summary Statistics

	(1) Treatment mean	(2) Control mean
Total Assets	20.93	6.50
Total deposit over Total Assets	0.62	0.52
Tier 1 capital over Total Assets	0.08	0.11
Net Loans over Total Assets	0.58	0.66
Impaired Loans over Total Assets	0.02	0.04
Government Bonds over Total Assets	0.03	0.12
Committed Credit Lines	0.10	0.05
ROA	0.45	0.86
ROE	5.79	7.86
Observations	3982	1397

Bank-Level Summary Statistics

Table: Summary Statistics

	(1) Treatment mean	(2) Control mean
Total Assets	20.93	6.50
Total deposit over Total Assets	0.62	0.52
Tier 1 capital over Total Assets	0.08	0.11
Net Loans over Total Assets	0.58	0.66
Impaired Loans over Total Assets	0.02	0.04
Government Bonds over Total Assets	0.03	0.12
Committed Credit Lines	0.10	0.05
ROA	0.45	0.86
ROE	5.79	7.86
Observations	3982	1397

⇒ Need to match treatment and control on banks' characteristics

Propensity Score Matching (PSM)

- ▶ We follow Lambert et. al (2017):

$$M_{ic} = \alpha + \beta_1 Ta_{ic} + \beta_2 Tier1_{ic} + \beta_3 ROA_{ic} + \\ + \beta_4 GvBonds_{ic} + \beta_5 AvClines_{ic} + \epsilon_{ic}$$

- ▶ We restrict our control group with a PSM
 - ▶ probit estimation:
Total Assets, Tier1 Equity, ROA, Gov. Bonds, Credit Lines
 - ▶ Nearest Neighbour matching with Caliper 0.1
 - ▶ No replacement
- ▶ We match our treatment and control in the **post period**

Bank-Level Baseline Results

$$DepRates_{ict} = \gamma_i + \lambda_t + \delta(T_c * post_t) + \epsilon_{ict}$$

	(1) Deposit Rates	(2) Log Total Deposits
$T_c \cdot post$	-0.0226** (0.0103)	0.0089 (0.0547)
Year Dummies	✓	✓
Country Fixed Effects	✓	✓
Observations	1220	1836
Adjusted R^2	0.4706	0.9834

Do Depositors Monitor Banks?

- ▶ Do riskier banks decrease deposit rates?
- ▶ Riskier banks no longer need to compete with safer banks for deposits
 - ▶ Riskier banks paid higher deposit rates to depositors before the policy change
 - ▶ They can now reduce the deposit rates more as depositors no longer monitor them
- ▶ We measure liquidity risk as $cl_{ict} = \frac{\text{Undrawn Credit Lines}_{ict}}{\text{Total Deposits}_{ict}}$
 - ▶ Higher cl_i , greater liquidity risk

Do Depositors Monitor Banks?

$$y_{ict} = \gamma_i + \lambda_t + \delta(T * post_t) + \phi(cl_i * post_t) + \alpha(T * cl_i * post_t) + \epsilon_{ict}$$

	(1) Deposit Rates	(2) Log Total Deposits
$T_c \cdot post$	-0.0464*** (0.0072)	0.0035 (0.1153)
Year Dummies	✓	✓
Country Fixed Effects	✓	✓
Observations	1220	1836
Adjusted R^2	0.5417	0.9817

Conclusions

- ▶ We exploited an exogenous variation in the EU increase in DI to study its effect on the banking industry
 - ▶ Banks' pass through higher costs to depositors
 - ▶ Deposits do not change
 - ▶ Riskier banks decrease risk more
- ▶ We undergo a cross-country and bank-level analysis
- ▶ Next steps: Do riskier banks exploit low-monitoring to undertake greater risk?
 - ▶ Quantile regression

BACK-UP SLIDES

Deposits as Risk-Sharing Contracts

Depositors face liquidity shocks:

- ▶ Banks entail maturity transformation and provide higher insurance, the higher are deposit rates
- ▶ Higher deposit rates increase run probability
- ▶ Higher deposit insurance reduce run probabilities and allow banks to increase deposit rates

back

Deposit Rates - Italy vs Average Treated

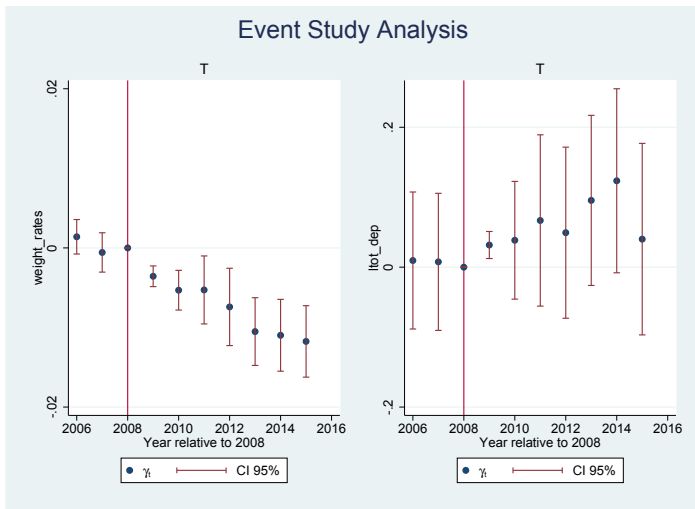
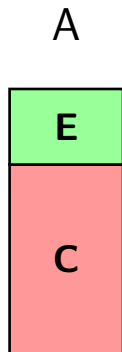



Figure: Deposit Rates - Treated Group and Italy

Eligible and Covered Deposits

Bank deposits in country A with €20,000 Limit



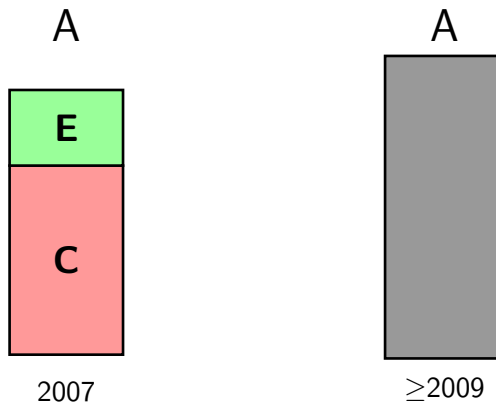
2007

 Eligible Deposits

 Covered Deposits

Eligible and Covered Deposits

Bank deposits in country A with €100,000 Limit



■ Eligible Deposits

■ Covered Deposits

Baseline Results

$$\text{LodDeposits}_{ct} = \gamma_c + \lambda_t + \delta(T_c \cdot \text{post}_t) + \epsilon_{ct}$$

Table: Cross Country Analysis - Robustness

Panel A	Log Total Deposit		
	(1)	(2)	(3)
<i>T · post</i>	-0.0579 (0.082)		
Year Dummies	✓		
Fixed Effects	✓		
Excluding France			
No Sovereign Crisis (years)			
Observations	110	100	55
Adjusted R^2	0.984	0.849	0.983

Baseline Results

$$\text{LodDeposits}_{ct} = \gamma_c + \lambda_t + \delta(T_c \cdot \text{post}_t) + \epsilon_{ct}$$

Table: Cross Country Analysis - Robustness

Panel A	Log Total Deposit		
	(1)	(2)	(3)
<i>T · post</i>	-0.0579 (0.082)	-0.0348 (0.0088)	
Year Dummies	✓	✓	
Fixed Effects	✓	✓	
Excluding France		✓	
No Sovereign Crisis (years)			
Observations	110	100	55
Adjusted R^2	0.984	0.849	0.983

Baseline Results

$$\text{LodDeposits}_{ct} = \gamma_c + \lambda_t + \delta(T_c \cdot \text{post}_t) + \epsilon_{ct}$$

Table: Cross Country Analysis - Robustness

Panel A	Log Total Deposit		
	(1)	(2)	(3)
<i>T · post</i>	-0.0579 (0.082)	-0.0348 (0.0088)	-0.0294 (0.0617)
Year Dummies	✓	✓	✓
Fixed Effects	✓	✓	✓
Excluding France		✓	
No Sovereign Crisis (years)			✓
Observations	110	100	55
Adjusted R^2	0.984	0.849	0.983