

# Fiscal consolidations and bank balance sheets

*Fourth Boston University/Boston Fed Conference on  
Macro-Finance Linkages*

Jacopo Cimadomo<sup>1</sup>   Sebastian Hauptmeier<sup>2</sup>  
Tom Zimmermann<sup>3</sup>

<sup>1</sup>European Central Bank

<sup>2</sup>European Commission

<sup>3</sup>Harvard University

4 October 2013

# MOTIVATION

- The interdependence between **fiscal policies and the financial sector** has been a fundamental aspect of the financial and economic crisis which escalated in 2008 with the default of Lehman
  - Governments strongly loosened their fiscal policies to:
    - ① Counteract the severe economic downturn that resulted from the financial market turmoil
    - ② Recapitalize distressed banks ( e.g. Ireland)
- ⇒ As a result, government deficit and debt ratios skyrocketed in many industrialized countries leading to a sovereign debt crisis since mid-2010

# MOTIVATION

- **Fiscal adjustment under way:** most industrialized countries have by now announced medium-term consolidation strategies which would lead to a significant fiscal tightening over the coming years.

⇒ This paper: uses a very rich data-set of banking and fiscal variables to analyze the **effects of fiscal consolidations on the portfolio choices of banks and banking sector stability.**

## CONTRIBUTION OF THE PAPER

- Using micro data on bank balance sheets and historical accounts of fiscal consolidation episodes based on the narrative approach, we find:
  - ① Fiscal consolidations tend to be associated with an improvement in banks capital adequacy ratios (Tier-1 and the total risk-weighted capital ratio)
  - ② Effect is attributable to banks re-balancing their portfolios from private securities to government securities
- To the best of our knowledge, one of the first papers to investigate the relationship between fiscal consolidations, banks' portfolio choices and banking sector stability

# OUTLINE

- ① INTRODUCTION
- ② LITERATURE
- ③ TRANSMISSION CHANNELS
- ④ DATA AND METHODOLOGY
- ⑤ RESULTS
- ⑥ CONCLUSION

## RELATED LITERATURE

- A lot of work on monetary policy and bank balance sheets: bank lending channel, financial accelerator (see e.g. Bernanke and Blinder, 1992; Bernanke, Gertler, Gilchrist, 1994; Kashyap and Stein, 1995)
- Little such work on fiscal policy, with few exceptions based on DSGE models:
  - Angeloni, Faia and Winkler (2011): focus on the composition of the fiscal adjustment, and on its consequences for banking stability
  - Dib (2010): loans decrease and banks equity goes down in response to a positive government spending shock
  - Caballero and Krishnamurthy (2004): fiscal expansions decrease the loan supply for private investment through a crowding-out effect.

⇒ No direct empirical test on the effects of fiscal policy on banks balance sheets and banking stability

# TIER1 RATIO AS INDICATOR OF BANKING STABILITY

Table: Stylized bank balance sheet

Assets	Liabilities
$L_t$	$D_t$
$B_t$	$E_t$
$R_t$	

Basel capital accords: focus on capital adequacy ratios (in particular, Tier-1 ratio):

$$Tier1 = \frac{E_t}{\theta L_t + B_t}, \theta > 1.$$

# TIER1 RATIO AS INDICATOR OF BANKING STABILITY

$$Tier1 = \frac{E_t}{\theta L_t + B_t}, \theta > 1.$$

- Numerator of Tier-1 capital ratio: includes basically equity and retained earnings
- Denominator of Tier-1 capital ratio: Risk weighted assets
- Good predictor of bank failure (Estrella et al, 2000)
- We will use the Tier-1 capital ratio and the Total capital ratio as our indicators of stability

⇒ In general: **re-balancing from private securities towards government securities** improves the Tier-1 and therefore the indicator of banking stability



# POTENTIAL CHANNELS FROM FISCAL CONSOLIDATION TO BANK BALANCE SHEETS

- ➊ **Demand - supply channel** If a fiscal adjustment is perceived to reduce the credit risk of a sovereign borrower, banks' demand for the bonds of this issuer should increase relative to other assets. At the same time, fiscal consolidation triggers a contraction in the supply of new government securities, given that the deficit is reduced.
- ➋ **Macroeconomic channel** Based on the standard Keynesian view, a fiscal tightening would exert a negative impact on GDP in the short run which tends to reduce banks capital bases, e.g. due to loan losses, and therefore weaken standard measures of capital adequacy (see, e.g., Goodhart et al. (2004)).

Figure 1: Effects of fiscal consolidation on holdings of government bonds by banks, when the **demand effect is stronger than the supply effect**

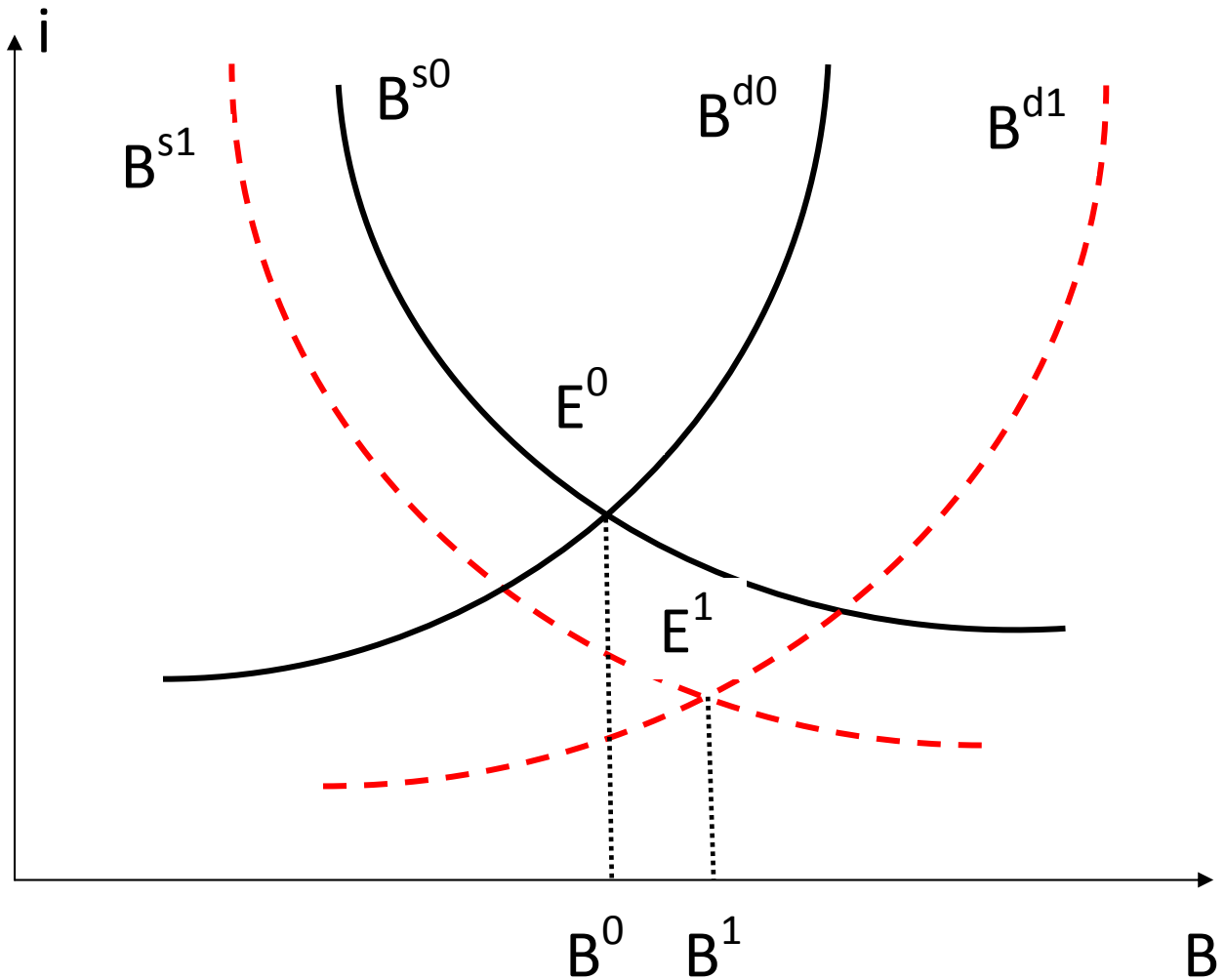
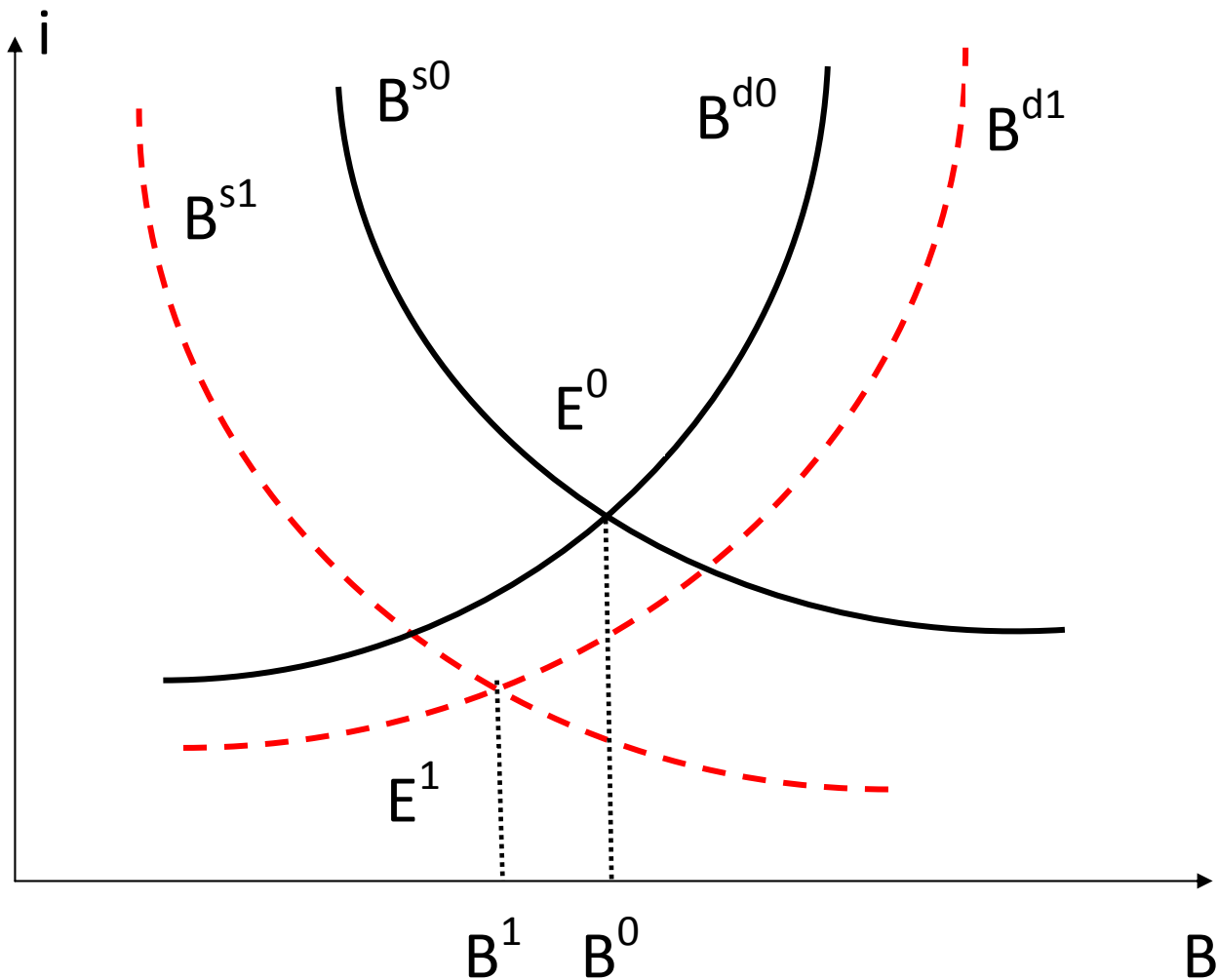


Figure 2: Effects of fiscal consolidation on holdings of government bonds by banks, when the **demand effect is weaker than the supply effect**



# BIS REPORT ON THE IMPACT OF SOVEREIGN RISK ON BANK FUNDING CONDITIONS (2011)

- Sovereign risk adversely affects banks through losses on their holdings of government papers.
- As a result of a weakening of the balance sheet funding of banks becomes more costly.
- Banks may therefore react to changes in sovereign risk through adjustments on the assets side, i.e. **changes in the portfolio composition**.
- In particular, banks may reduce the risks related to sovereign debt by decreasing the amount of govt securities holdings and making greater use of stable funding sources such as bonds, retail deposits and equity.
- By the same token: **decreases in sovereign risk (through fiscal consolidation) should increase holdings of govt securities and improve funding conditions**

# THIS PAPER

- Controlling for the macroeconomic channel and other bank-specific indicators:
  - ① Tests the effects of fiscal consolidations on the Tier1 capital ratio, at the individual bank level
  - ② Investigates possible portfolio re-balancing effects
- Analysis based a very rich data set including around 100,000 individual bank balance sheet observations for 17 industrialized countries, from 1994 to 2009

# DATA

- Data come from three different sources: OECD EO, BankScope and a new data set on fiscal consolidations
- BankScope provides bank balance sheet data and income statements from 1990 to 2009 for up to  $\sim 20,000$  banks.
- Clean up:
  - Restrict to 1994 to 2009
  - Unconsolidated balance sheets
  - Commercial banks, savings banks and cooperative banks
- 160,000 b-y observations, about 100,000 that we can use.
- Sample pre-dominantly US based: 60%

# BANKSCOPE: BANK-YEAR OBSERVATIONS (EXCERPT)

Year Country	2002	2003	2004	2005	2006	2007	2008	2009	Total
AT	179	220	239	245	256	257	234	194	2780
AU	26	25	23	25	25	27	25	18	438
BE	65	67	58	53	49	41	36	33	968
CA	11	12	13	16	18	17	17	16	215
DE	1553	1442	1421	1704	1717	1698	1648	1567	27011
DK	92	90	94	95	97	97	111	100	1521
ES	152	145	148	191	192	101	151	159	2409
FI	6	8	9	8	6	8	11	11	116
FR	284	272	254	257	245	240	233	213	4588
GB	141	145	162	136	132	126	132	113	2014
IE	30	29	33	32	33	31	26	24	399
IT	688	678	676	1172	648	661	641	503	9848
JP	713	661	630	618	606	595	587	575	8083
NL	36	33	33	33	30	30	29	24	527
PT	22	21	20	21	20	22	23	20	347
SE	95	96	90	94	89	84	76	73	863
US	9134	9145	8925	8788	8633	8492	8251	7988	99660
Total	13227	13089	12828	13488	12796	12527	12231	11631	161787

## BANKS: SUMMARY STATISTICS

Year	Tier-1 capital ratio			Total capital ratio			Total assets (Mill USD)		
	p10	p50	p90	p10	p50	p90	p10	p50	p90
1994	8.20	12.40	24.70	10.30	14.00	26.20	119.70	576.60	4995.70
1995	8.20	12.50	26.20	10.40	14.10	27.80	104.10	580.65	5218.20
1996	8.10	12.00	25.20	10.40	14.00	27.60	97.50	590.50	5600.80
1997	8.10	12.20	24.10	10.40	13.70	27.30	77.50	543.00	5531.40
1998	8.50	14.30	30.60	10.30	15.15	31.50	68.40	503.20	5475.70
1999	9.60	14.80	30.40	10.80	15.70	31.40	24.71	117.07	1729.30
2000	9.50	14.20	29.90	10.60	15.20	31.00	25.35	123.04	1804.90
2001	9.40	13.80	28.00	10.70	14.90	29.20	27.98	133.64	1925.33
2002	9.50	13.90	28.40	10.70	15.00	29.50	29.81	143.06	2024.90
2003	9.60	13.90	29.10	10.80	15.10	30.30	31.21	153.31	2089.90
2004	9.50	13.90	29.20	10.70	15.00	30.20	32.70	165.30	2291.50
2005	9.60	13.80	29.50	10.80	14.90	30.40	34.45	172.52	2190.21
2006	9.60	13.70	30.30	10.76	14.80	31.24	35.28	180.18	2375.47
2007	9.50	13.50	30.10	10.60	14.50	30.40	37.36	189.84	2530.90
2008	9.30	13.00	27.40	10.60	14.30	27.60	40.72	203.72	2668.95
2009	9.41	13.17	25.66	10.60	14.44	26.00	43.98	215.77	2666.71

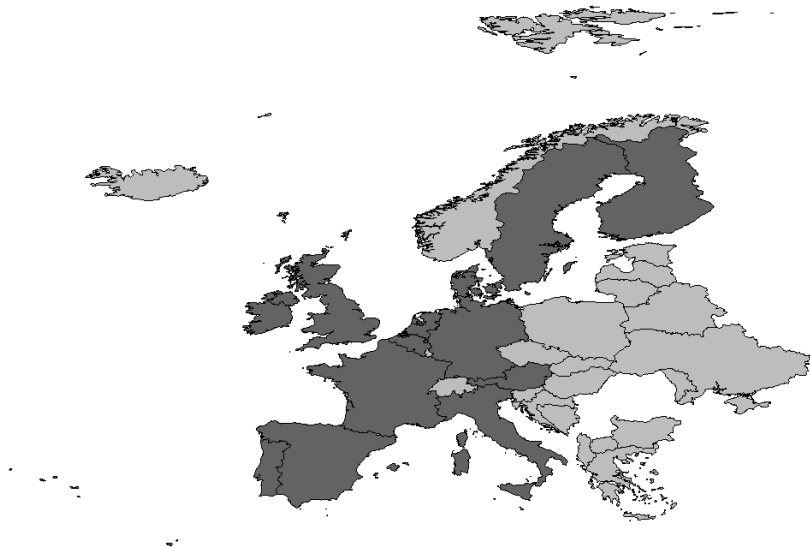


# CONSOLIDATION DATA

- Devries et al (2011) extend the narrative approach advanced in Romer and Romer (2010) to 17 countries from 1979 to 2009 → **unexpected and unsystematic** (wrt the economic cycle) consolidation episodes coverage

# CONSOLIDATION DATA: COUNTRY COVERAGE (EU)

Also data on AUS, CAN, JAP, USA



## CONSOLIDATION DATA

- Devries et al (2011) extend the narrative approach advanced in Romer and Romer (2010) to 17 countries from 1979 to 2009
- 82 episodes between 1994 and 2009
- Example from Devries et al (2011):

*Germany 1997: Fiscal consolidation totaled 1.60 percent of GDP, with spending cuts of 1.10 percent of GDP and tax hikes of 0.50 percent of GDP. Fiscal consolidation in 1997 was primarily motivated by deficit reduction and meeting the Maastricht deficit criteria, as the 1997 IMF Staff Report reports (p. 20): "To shore up the public finances, the authorities adopted in late 1996 substantial discretionary fiscal measures as part of the budget for 1997, which were heavily weighted on spending cuts [...]"*

## CONSOLIDATION DATA: SUMMARY

Country	# FC	Mean FC
AT	4	0.346
AU	6	0.155
BE	3	0.191
CA	4	0.183
DE	10	0.439
DK	1	0.019
ES	4	0.303
FI	4	0.426
FR	5	0.113
GB	6	0.164
IE	1	0.296
IT	9	0.824
JP	7	0.261
NL	2	0.138
PT	6	0.313
SE	5	0.549
US	5	0.136

# CONSOLIDATION DATA

- Further consolidation measure: Change in cyclically adjusted primary balance.
- Subject to criticisms (potential endogeneity, measurement error, subsequent economic developments)
- Consider only improvements greater than 0.5%.

# METHODOLOGY

- Structure of the data allows exploitation of cross-sectional and time series variation
- First pass: Panel data estimation of

$$y_{ij,t} = \sum_{s=1}^j \alpha_j y_{ij,t-s} + \sum_{s=0}^p \gamma_p FC_{i,t-s} + \sum_{s=0}^l \beta_s X_{t-s} + \mu_j + \lambda_t + \epsilon_{ij,t},$$

- $y_{ij,t}$  change in capital ratio (Use Tier-1 capital ratio and total capital ratio)
- $X_t$  includes bank specific (size and profits) and macroeconomic controls (change in yield curve, output gap, government debt)
- Estimate using Arellano-Bond estimator to deal with Nickell bias

## BASELINE REGRESSION (EXCERPT)

	Tier-1	Tier-1	Total cap	Total cap
lagged dep	-0.015**	-0.015**	-0.018***	-0.017***
$FC_t$	0.082***		0.044*	
$FC_{t-1}$	0.044**		0.053***	
$CAPB_t$		0.015*		0.015*
$CAPB_{t-1}$		0.033***		0.023***
$SIZE_{t-1}$	0.166***	0.167***	0.163***	0.164***
$ROAA_{t-1}$	-0.004***	-0.004***	-0.003**	-0.004***
$GAP_t$	-0.004	-0.004	0.000	-0.000
$(r_{l,t-1} - r_{s,t-1})$	0.009***	0.015***	0.011***	0.014***
$Debt_t$	0.045	0.122**	0.054	0.100*
N	73957	73957	75039	75039

## BASELINE REGRESSION (EXCERPT)

	Tier-1	Tier-1	Total cap	Total cap
lagged dep	-0.015**	-0.015**	-0.018***	-0.017***
$FC_t$	0.082***		0.044*	
$FC_{t-1}$	0.044**		0.053***	
$CAPB_t$		0.015*		0.015*
$CAPB_{t-1}$		0.033***		0.023***
$SIZE_{t-1}$	0.166***	0.167***	0.163***	0.164***
$ROAA_{t-1}$	-0.004***	-0.004***	-0.003**	-0.004***
$GAP_t$	-0.004	-0.004	0.000	-0.000
$(r_{l,t-1} - r_{s,t-1})$	0.009***	0.015***	0.011***	0.014***
$Debt_t$	0.045	0.122**	0.054	0.100*
N	73957	73957	75039	75039



# EXPLAINING THE INCREASE IN CAPITAL RATIOS

- Evidence that fiscal consolidation increases capital ratios

$$\text{Tier1 ratio}_t = \frac{\text{Tier1 capital}_t}{(L_t^f + \theta_1 L_t^c) + (\theta_2 B_t^i + \theta_3 B_t^g)}, 1 > \theta_1 > \theta_2 > \theta_3$$

- Think of  $\theta_1 = .5, \theta_2 = .2$  and  $\theta_3 = 0$
- Why the positive response?
- Increase in the numerator or decrease in the denominator?

# EXPLAINING THE INCREASE IN CAPITAL RATIOS

		<i>FC</i>	SE	<i>CAPB</i>	SE
Tier 1 ratio	Numerator	-0.004	0.021	-0.033	0.011
	Denominator	-0.135	0.028	-0.100	0.012
	Difference	0.131	0.036	0.067	0.016
Total cap ratio	Numerator	-0.013	0.023	-0.043	0.010
	Denominator	-0.118	0.031	-0.093	0.012
	Difference	0.105	0.038	0.050	0.015

## COMPOSITIONAL EFFECTS

- Increase driven by decrease in the denominator (RWA):

$$(L_t^f + \theta_1 L_t^c) + (\theta_2 B_t^i + \theta_3 B_t^g)$$

- Consider the change in the share of private sector loans relative to government securities:

$$\frac{L_t^f + L_t^c + B_t^i}{B_t^g}$$

⇒ **Re-balancing on the government securities** side triggers a decrease in the denominator and increase in Tier-1 and total asset ratio

# PORTFOLIO RE-BALANCING

Table: Growth of volume shares relative to the public sector

	all priv.		corp. priv		adjust. corp	
lagged dep	-0.039 (.036)	-0.038 (.036)	-0.024 (.039)	-0.021 (.041)	-0.015 (.040)	-0.012 (.042)
$FC_t$	-0.124 (.221)		-0.263 (.236)		-0.271 (.302)	
$FC_{t-1}$	-0.564 (.175)		-0.573 (.192)		-0.65 (.243)	
$CAPB_t$		-0.176 (.221)		-0.239 (.222)		-0.148 (.276)
$CAPB_{t-1}$		0.03 (.243)		-0.049 (.252)		0.076 (.310)

## SUB-SAMPLES AND ADDITIONAL CONTROLS

	Tier 1 capital ratio		Total capital ratio	
	FC	CAPB	FC	CAPB
Baseline	0.126	0.048	0.097	0.038
	(.027)	(.013)	(.026)	(.011)
Pre-crisis (1994-2006)	.099	.036	.096	.024
	(.034)	(.015)	(.029)	(.013)
Excluding US	.180	-.079	.125	-.084
	(.037)	(.082)	(.032)	(.056)
No prior banking crisis	0.115	0.048	0.092	0.036
	(.028)	(.012)	(.026)	(.011)
Basel II	.161	.025	.128	.019
	(.027)	(.014)	(.026)	(.012)
Banking crises	.128	.048	.098	.039
	(.027)	(.013)	(.026)	(.011)
Stock market crises	.146	.042	.116	.033
	(.028)	(.013)	(.026)	(.011)
Currency crises	.092	.048	.077	.037
	(.028)	(.013)	(.027)	(.011)
Exchange rate	.125	.064	.096	.051
	(.027)	(.014)	(.026)	(.012)

# STATE-DEPENDENT EFFECTS OF FISCAL CONSOLIDATION

	Tier 1 capital ratio		Total capital ratio	
	<i>FC</i>	<i>CAPB</i>	<i>FC</i>	<i>CAPB</i>
Not in crisis	.145 (.027)	.042 (.013)	.129 (.024)	.025 (.011)
In crisis	.195 (.029)	.081 (.064)	.225 (.039)	.172 (.041)

## BASELINE: RESPONSE BY BANK TYPE

	Tier 1 capital ratio		Total capital ratio	
	<i>FC</i>	<i>CAPB</i>	<i>FC</i>	<i>CAPB</i>
Commercial banks	0.215	0.073	0.137	0.062
	0.086	0.018	0.065	0.016
Cooperative banks	0.060	-0.059	-0.003	0.048
	0.064	0.203	0.057	0.154
Savings banks	0.082	0.018	0.192	0.030
	0.110	0.036	0.114	0.031

## BASELINE: ROBUSTNESS TO SPECIFICATION AND ESTIMATION METHOD

	Tier 1 capital ratio		Total capital ratio	
	<i>FC</i>	<i>CAPB</i>	<i>FC</i>	<i>CAPB</i>
Arellano-Bond	0.126	0.048	0.097	0.038
S.E.	0.027	0.013	0.026	0.011
Fixed effects, dynamic	0.061	0.071	0.051	0.065
S.E.	0.017	0.010	0.016	0.009
Fixed effects, static	0.060	0.065	0.057	0.079
S.E.	0.016	0.010	0.016	0.008



## EFFECTS ON EXPECTED DEFAULT PROBABILITIES

---

	EDP75	EDP50	EDP25
$FC_t$	-1.312 (.220)	-0.907 (.315)	-0.659 (.156)
$FC_{t-1}$	-0.019 (.190)	0.087 (.193)	0.147 (.244)
$GAP_t$	-0.174 (.091)	-0.053 (.049)	-0.034 (.042)
$\Delta(r_{l,t-1} - r_{s,t-1})$	0.001 (.094)	-0.026 (.093)	-0.006 (.064)
$Debt_t$	0.032 (.011)	0.017 (.007)	0.017 (.008)
$EDP75_{t-1}$	-0.593 (.171)		
$EDP50_{t-1}$		-0.423 (.091)	
$EDP25_{t-1}$			-0.332 (.075)
N	121	121	121

---

# CONCLUSION

- First contribution to assess empirically the link between fiscal consolidations and banking stability
- Based on a large panel data set from bank data and historical accounts of fiscal consolidations we find:
  - ① Positive effect of consolidation on banking stability, as represented by standard capital adequacy ratios
  - ② This is due to portfolio re-balancing from private securities to government securities
- Results robust to different estimation method and specification, sub-samples, and definitions of banking stability and consolidations episodes