

Can Central Banks Boost Corporate Investment? Evidence from ECB Liquidity Injections



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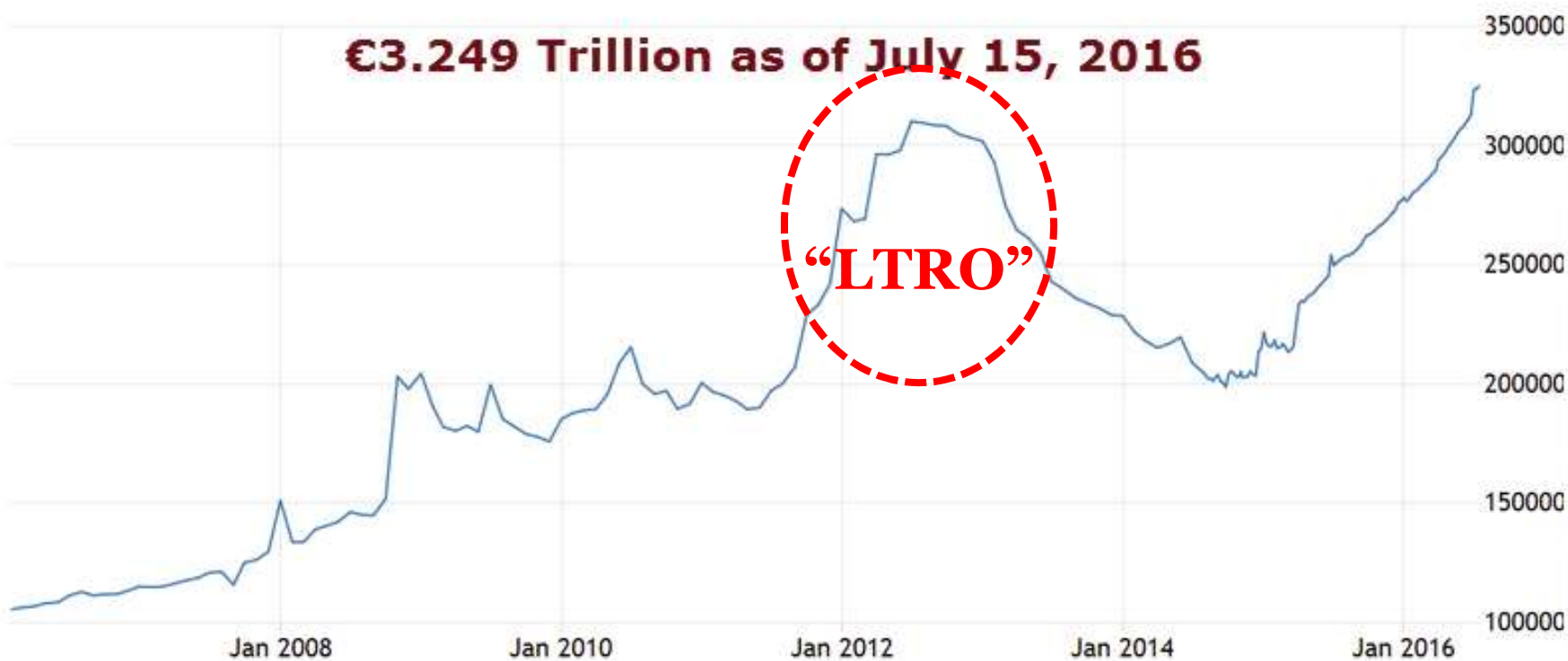


ECB Balance Sheet

2

EU CENTRAL BANK BALANCE SHEET

€3.249 Trillion as of July 15, 2016

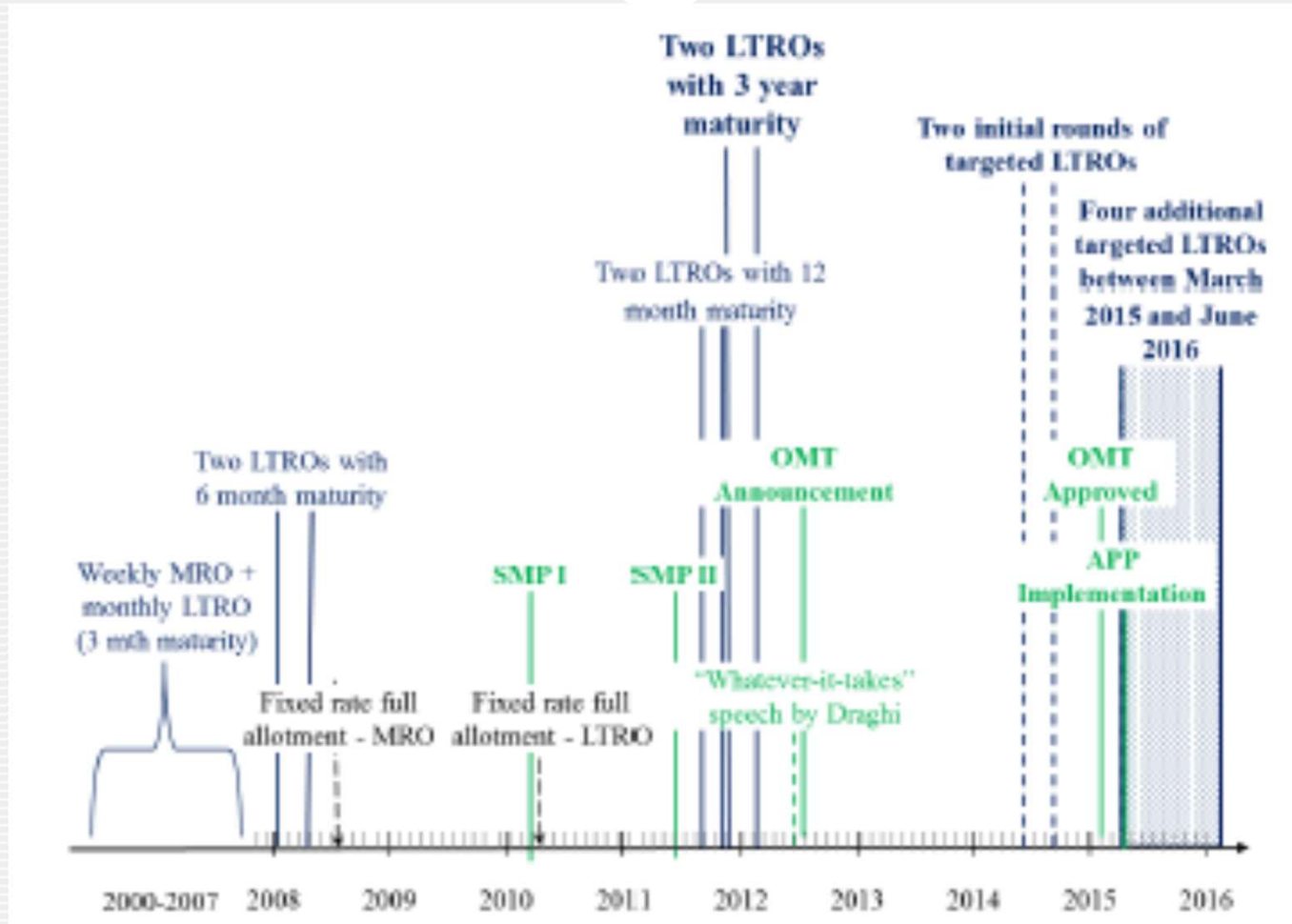


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Busy ECB

3





Bank of England, Haldane et al., Oct. 2016

4

- “[QE’s] effects on the yield curve, equity prices, corporate bond spreads and the exchange rate were **all large and significant.**”
- “What ultimately matters for monetary policy, however, is the impact of these asset purchases on **the economy.**”
- “In general, however, estimates are quite **uncertain.**”



Mario Draghi: “Monetary Policy Works!”

5

- 2015/09/03 by Mario Draghi, President of the ECB: “I would say that our accommodative **monetary policy is being passed through to the rest of the economy**. ... **So we have evidence that our monetary policy works**. ...so we'll have to see whether these effects are transitory or are permanent.”
 - <https://www.ecb.europa.eu/press/pressconf/2015/html/is150903.en.html>
- 2016/07/21: “the Governing Council will continue to monitor economic and financial market developments very closely and to safeguard the pass-through of its accommodative monetary policy to the real economy. ... Let me now explain our **assessment** ... **Domestic demand** remains supported by the pass-through of our monetary policy measures to the real economy. Favorable financing conditions and improvements in corporate profitability continue to promote a recovery in **investment**.”
 - <https://www.ecb.europa.eu/press/pressconf/2016/html/is160721.en.html>



The Objection: “*Failure to Spark*”

6

- 2015/09/08: *Financial Times*:
“Despite cheap credit and low interest rates, many companies say it is still too early to spend”
- Ralf Thomas, **CFO of Siemens**:
“Investments are driven far more by assumptions around growth, potential profit and technological barriers to entry, rather than movements in interest rates... *We don’t decide to spend more just because interest rates are lower for a couple of years.*”



\$1.1 trillion

Cash piles at European non-financial companies, up 40% from 2008



Our Study: LTRO and Corporate Policies

7

- Liquidity transmission from **macro to micro?**

ECB LTRO → Bank Liquidity → Credit Supply to Firms → Corporate Liquidity → Corporate Investment?

- **Investment**

- Employment
- Cash holdings
- Debt structure

2018/11/2: “**ECB is considering another LTRO**”



Findings and Contributions

8

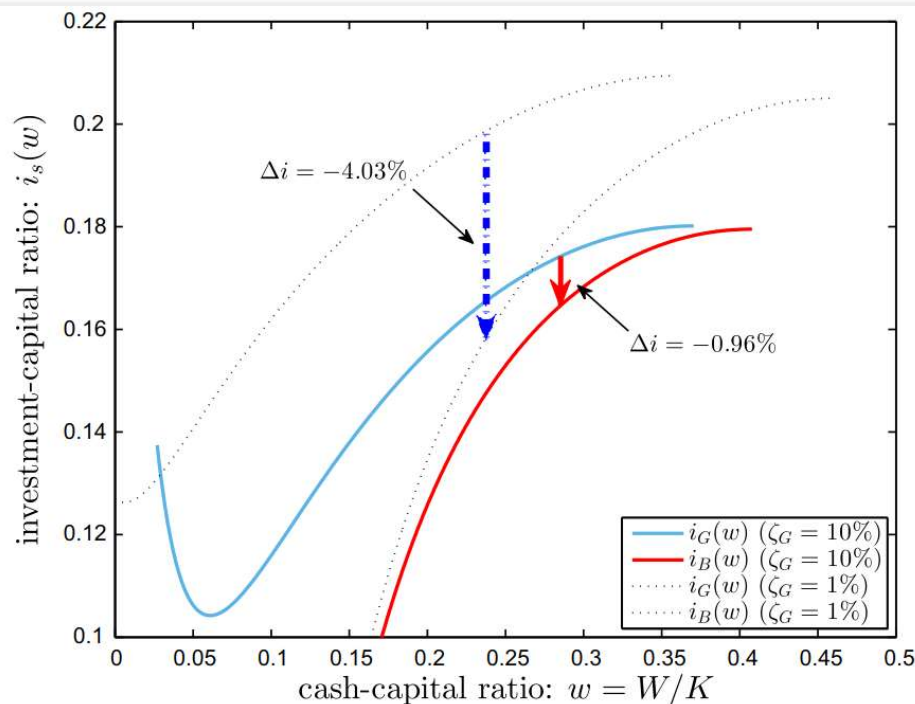
- LTRO → more cash, but **no increase in investment**
 - Even if banks keep the funds for longer time
 - Especially for risky banks
 - Investment not decreasing if firms receive a **new loan**
- Fiscal-monetary policy interaction is important
- **Without LTRO, Eurozone could have fared worse**
- Cross-country analysis
- Existing studies
 - securities markets programme (SMP) asset purchases
 - on banks/financial markets
 - specific countries, often one at a time
 - related work from U.S./U.K., e.g., Berger and Roman (2016 *JFQA*), Weale and Wieladek (2016 *JME*)
 - Negative credit supply shocks decrease investment, but little work on the effectiveness of **positive credit supply shocks**



Theoretical Framework

9

- Bolton, Chen, and Wang (2013 *JFE*):
 - “Market Timing, Investment, and Risk Management”
 - Precautionary-savings vs market-timing
 - “Real effects of financing shocks may be **smoothed out** as a result of firms’ adjustments in anticipation of future financial crises”





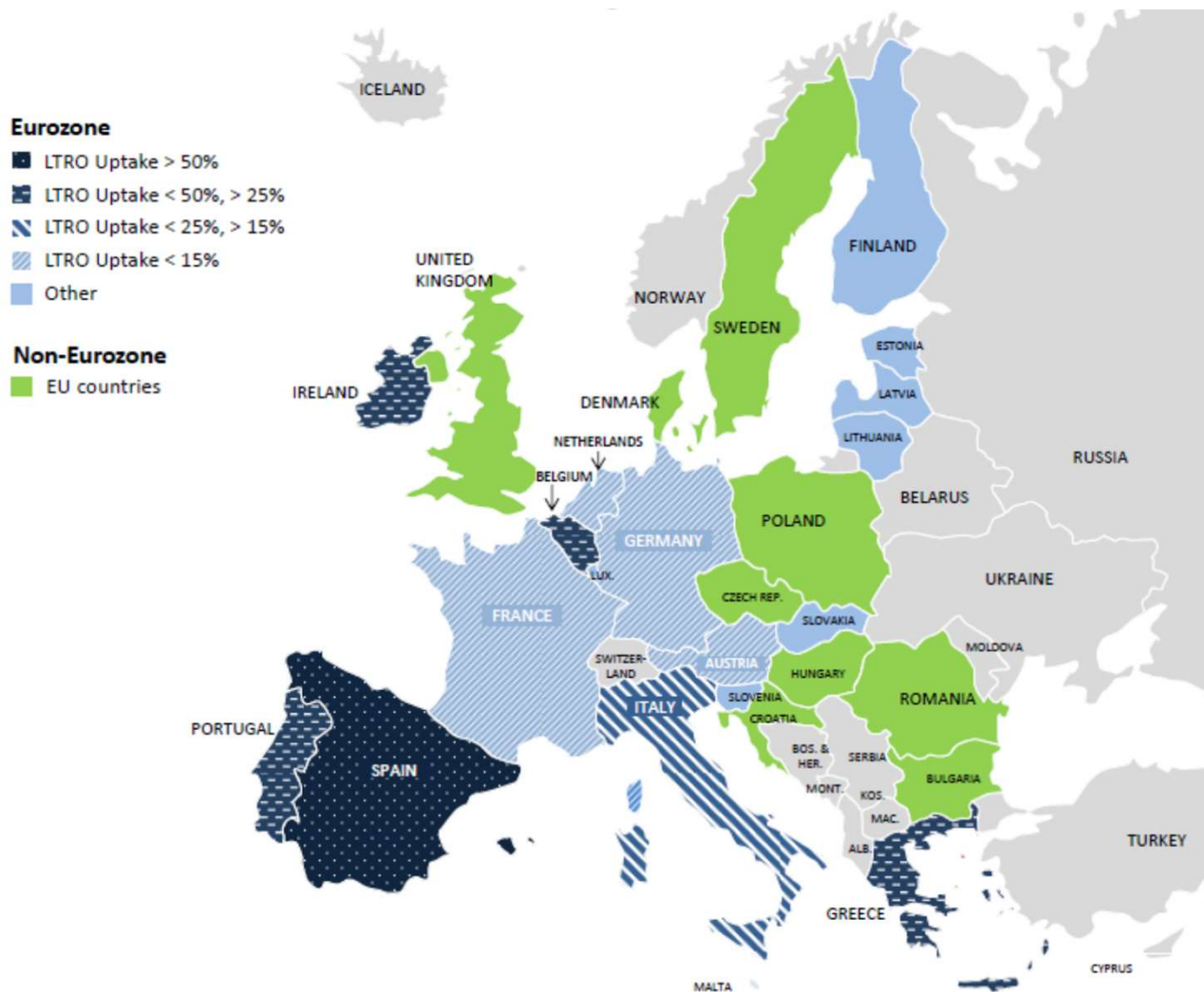
Data

10

- 21 Eurozone and non-Eurozone countries
- Sample period: 2009-2014; non-financial firms
- Compustat Global; Capital IQ, S&P Ratings
- DealScan
- Markit CDS
- The World Bank
- Transparency International
- ECB Statistics Warehouse
- **Bloomberg**
- Key measure: *Lender LTRO Uptake*



Longer-Term Refinancing Operations (LTRO)



- LTRO I: December 2011; LTRO II: February 2012



LTRO Uptake

12

Country	LTRO I: Dec. 2011 EUR billion (1)	LTRO II: Feb. 2012 EUR billion (2)	Total EUR billion (3)	LTRO Uptake % of government debt (4)
Austria	3.66	7.83	11.49	4.82
Belgium	45.28	43.71	88.99	25.02
France	5.59	6.52	12.12	0.61
Germany	12.25	13.13	25.38	1.67
Greece	60.94 ^a		60.94 ^a	25.54
Ireland	21.91	17.62	39.52	22.33
Italy	172.08	128.11	300.20	15.92
Netherlands	8.86	1.96	10.81	2.58
Portugal	24.54	24.76	49.30	29.37
Spain	153.21	165.53	318.74	51.44
Total	508.32	409.17	917.49	

LTRO and Corporate Cash Holdings

13

	Cash	Cash	Cash
	(1)	High Bank Debt (2)	Low Bank Debt (3)
LTRO Uptake	2.169*** (0.56)	2.609*** (0.61)	0.166 (0.98)
Industry Sigma	0.021 (0.01)	0.102*** (0.02)	-0.016 (0.02)
Cash Flow/Assets	0.001 (0.00)	0.000 (0.00)	0.004 (0.00)
Market to Book	0.014*** (0.00)	0.015*** (0.00)	0.015*** (0.00)
Size	-0.113 (0.07)	-0.714*** (0.10)	0.662*** (0.12)



Credit Supply and Investment

14

- Negative credit supply shocks → investment ↓
 - Chava and Purnanandam (2011 JFE)
 - And many others
- Bond market access → investment ↑
 - Harford and Uysal (2014 JFE)
- Liquidity injection → investment?
 - Japan? China?



LTRO Update and Corporate Investment

	Investments (1)	Wages (2)
Lender LTRO Uptake	-0.158** (0.08)	-0.034 (0.05)
Cash Flow	0.006** (0.00)	0.004 (0.00)
Market to Book	0.005*** (0.00)	0.001 (0.00)
Firm Size	0.160** (0.07)	0.695*** (0.05)
Leverage	-0.015*** (0.00)	-0.001 (0.00)
Rated	0.016 (0.15)	-0.044 (0.12)
Sovereign Risk	-0.650*** (0.05)	-0.036 (0.04)
Sovereign Export	-0.057*** (0.00)	0.004 (0.00)
Time FE	Y	Y
Firm FE	Y	Y
R-square	0.721	0.744
N	16320	12458



Bank Risk

	Investments		Investments			
	Risky Lender (1)	Safe Lender (2)	GIIPS		Non-GIIPS	
			Risky Lender (3)	Safe Lender (4)	Risky Lender (5)	Safe Lender (6)
Lender LTRO Uptake	-0.337*** (0.10)	0.047 (0.08)	-0.513*** (0.14)	2.114 (2.06)	-0.213 (0.14)	0.038 (0.08)
Cash Flow	0.010* (0.00)	0.007 (0.00)	0.010 (0.00)	0.059*** (0.01)	0.015** (0.00)	0.004 (0.00)
Market to Book	0.006*** (0.00)	0.009*** (0.00)	0.016*** (0.00)	0.013*** (0.00)	0.001 (0.00)	0.009*** (0.00)
Firm Size	0.139 (0.12)	0.097 (0.11)	-0.079 (0.20)	-1.039*** (0.33)	0.559*** (0.14)	0.218* (0.11)
Leverage	-0.016*** (0.00)	-0.021*** (0.00)	-0.011** (0.00)	0.015* (0.00)	-0.032*** (0.00)	-0.025*** (0.00)
Rated	0.008 (0.18)	0.352 (0.22)	-1.131*** (0.30)	1.401** (0.61)	0.524** (0.21)	0.295 (0.23)
Sovereign Risk	-0.830*** (0.08)	-0.247*** (0.08)	-0.300*** (0.11)	-0.087 (0.12)	-0.928*** (0.17)	-0.104 (0.13)
Sovereign Export	-0.089*** (0.01)	-0.068*** (0.01)	-0.205*** (0.03)	0.063 (0.04)	-0.060*** (0.01)	-0.067*** (0.01)
Time FE	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y
<i>R</i> -square	0.774	0.794	0.777	0.826	0.796	0.793
<i>N</i>	4869	5168	1906	475	2963	4693



Bank-Dependent Firms

17

Investments

	High Bank Debt (1)	Low Bank Debt (2)
Lender LTRO Uptake	-0.255** (0.10)	-0.025 (0.12)
Cash Flow	0.000 (0.00)	0.008** (0.00)
Market to Book	0.008*** (0.00)	0.004*** (0.00)
Firm Size	-0.241** (0.11)	0.561*** (0.10)
Leverage	-0.021*** (0.00)	-0.010*** (0.00)
Rated	0.012 (0.30)	0.023 (0.17)
Sovereign Risk	-0.739*** (0.07)	-0.497*** (0.07)
Sovereign Export	-0.044*** (0.01)	-0.061*** (0.01)
Time FE	Y	Y
Firm FE	Y	Y
<i>R</i> -square	0.718	0.716
<i>N</i>	6977	9235



Credit Access: Credit Ratings

18

Panel A: Firm Credit Rating

	Investments	
	Rated Firm (1)	Non-Rated Firm (2)
Lender LTRO Uptake	0.581*** (0.14)	-0.245*** (0.08)
Cash Flow	0.008 (0.00)	0.006* (0.00)
Market to Book	-0.002 (0.00)	0.006*** (0.00)
Firm Size	0.229 (0.14)	0.085 (0.08)
Leverage	-0.010** (0.00)	-0.016*** (0.00)
Sovereign Risk	-0.799*** (0.10)	-0.632*** (0.05)
Sovereign Export	-0.017 (0.01)	-0.064*** (0.01)
Time FE	Y	Y
Firm FE	Y	Y
R-square	0.829	0.715
N	2452	13868



Credit Access: Firm Size

19

Panel B: Firm Size

	Investments	
	Large Firm (1)	Small Firm (2)
Lender LTRO Uptake	0.063 (0.08)	-0.544*** (0.17)
Cash Flow	0.003 (0.00)	0.006 (0.00)
Market to Book	0.008*** (0.00)	0.004*** (0.00)
Firm Size	-0.021 (0.10)	0.361*** (0.11)
Leverage	-0.024*** (0.00)	-0.011*** (0.00)
Rated	0.233 (0.14)	0.727 (0.56)
Sovereign Risk	-0.727*** (0.07)	-0.608*** (0.07)
Sovereign Export	-0.057*** (0.01)	-0.048*** (0.01)
Time FE	Y	Y
Firm FE	Y	Y
<i>R</i> -square	0.759	0.683
<i>N</i>	8302	7910



Determinants of LTRO Uptake

20

Panel A: Bank-specific LTRO borrowing indicator

	LTRO Borrowing Indicator _{<i>j</i>,11/12}			LTRO Borrowing Indicator _{<i>j</i>,11/12}	
	All Banks (1)	All Banks (2)	All Banks (3)	GIIPS Banks (4)	Non-GIIPS Banks (5)
High Risk Bank _{<i>j</i>,10}	1.237*** (0.358)	1.584*** (0.424)	1.414*** (0.446)	1.053 (0.833)	3.032*** (1.076)
Bank Size _{<i>j</i>,10}	0.174** (0.080)	0.388*** (0.111)	0.538*** (0.134)	1.266*** (0.345)	0.551** (0.264)
Borrower Size _{<i>j</i>,10}		-0.11 (0.264)	-0.18 (0.281)	-0.62 (0.511)	-0.21 (0.704)
Borrower Leverage _{<i>j</i>,10}		0.034 (0.023)	0.016 (0.026)	0.038 (0.050)	-0.01 (0.066)
Borrower Short-term Debt _{<i>j</i>,10}		-7.66 (4.689)	-9.08* (5.284)	-15.3* (9.235)	-49.3* (26.50)
Borrower Cash Flow _{<i>j</i>,10}		-0.26** (0.117)	-0.21* (0.114)	-0.52** (0.231)	0.060 (0.200)
Sovereign Risk ₁₀			1.269*** (0.405)	1.986 (2.787)	0.174 (0.898)
Pseudo <i>R</i> -square	0.085	0.222	0.280	0.501	0.417
<i>N</i>	185	155	155	80	75



Determinants of LTRO Uptake

21

Panel B: Bank-specific LTRO borrowing amount

	Log(1 + Total Bank LTRO Borrowing)			Log(1 + Total Bank LTRO Borrowing)	
	All Banks (1)	All Banks (2)	All Banks (3)	GIIPS Banks (4)	Non-GIIPS Banks (5)
High Risk Bank _{<i>j</i>,10}	0.782*** (0.18)	0.789*** (0.19)	0.621*** (0.19)	0.450* (0.20)	0.502** (0.21)
Bank Size _{<i>j</i>,10}	0.061*** (0.00)	0.174*** (0.03)	0.248*** (0.04)	0.484*** (0.06)	0.099** (0.03)
Borrower Size _{<i>j</i>,10}		-0.138** (0.05)	0.033 (0.06)	-0.028 (0.13)	-0.107 (0.07)
Borrower Leverage _{<i>j</i>,10}		0.012 (0.00)	0.005 (0.00)	0.002 (0.01)	0.006 (0.00)
Borrower Short-term Debt _{<i>j</i>,10}		-2.969** (1.42)	-1.818 (1.38)	-2.797 (1.98)	-3.485* (1.99)
Borrower Cash Flow _{<i>j</i>,10}		-0.045 (0.03)	-0.028 (0.02)	-0.067** (0.03)	0.005 (0.04)
Sovereign Risk ₁₀			0.486*** (0.12)	0.728** (0.28)	-0.023 (0.11)
<i>R</i> -square	0.418	0.447	0.500	0.750	0.293
<i>N</i>	185	155	155	80	75



LTRO Repayment

22

Country	Total LTRO Holdings				Repayment Ratio
	2010	2011	2012	2013	2012 to 2013
	EUR billion	EUR billion	EUR billion	EUR billion	percentage
	(1)	(2)	(3)	(4)	(5)
Austria	3.49	7.18	15.71	5.87	-62.62
Belgium	4.12	17.97	39.92	14.29	-64.22
France	20.22	123.14	172.88	61.53	-64.41
Germany	33.46	47.11	69.65	13.77	-80.23
Greece	78.38	60.94	1.95	1.39	-28.79
Ireland	56.03	76.29	63.09	34.50	-45.31
Italy	31.01	160.61	268.30	213.71	-20.35
Netherlands	0.92	3.19	24.48	8.81	-63.99
Portugal	22.97	39.03	49.26	42.69	-13.33
Spain	39.66	156.68	315.35	178.06	-43.53
Total	290.26	692.13	1020.58	574.62	-43.70



Early Repayment

23

	Investments		
	Low Early LTRO-Repayment (1)	Medium Early LTRO-Repayment (2)	High Early LTRO-Repayment (3)
Lender LTRO Uptake	-4.219*** (0.73)	-0.132 (0.08)	1.055 (2.90)
Cash Flow	0.016 (0.01)	0.005 (0.00)	0.008 (0.00)
Market to Book	0.009*** (0.00)	0.003*** (0.00)	0.007*** (0.00)
Firm Size	0.006 (0.23)	0.121 (0.10)	0.681*** (0.14)
Leverage	-0.006 (0.00)	-0.015*** (0.00)	-0.027*** (0.00)
Rated	-0.554 (0.36)	0.002 (0.18)	1.064*** (0.40)
Sovereign Risk	0.075 (0.10)	-1.244*** (0.10)	0.992 (2.26)
Sovereign Export	-0.245*** (0.03)	-0.073*** (0.01)	2.688 (4.02)
Time FE	Y	Y	Y
Firm FE	Y	Y	Y
R-square	0.693	0.747	0.722
N	2407	8406	4396



New Loans

	Investments		Investments	
	(1)	(2)	High Bank Debt (3)	Low Bank Debt (4)
Lender LTRO Uptake	-0.010 (0.07)	-0.096 (0.08)	-0.418*** (0.14)	0.200** (0.09)
Lender LTRO Uptake × New Loan		0.269* (0.14)	0.676*** (0.20)	0.529 (0.97)
Cash Flow	0.003 (0.00)	0.003 (0.00)	0.004 (0.00)	0.006 (0.00)
Market to Book	0.007*** (0.00)	0.007*** (0.00)	0.007*** (0.00)	0.007*** (0.00)
Firm Size	0.028 (0.10)	0.028 (0.10)	-0.657*** (0.18)	0.545*** (0.13)
Leverage	-0.029*** (0.00)	-0.028*** (0.00)	-0.024*** (0.00)	-0.034*** (0.00)
Rated	-0.142 (0.17)	-0.145 (0.17)	-0.593 (0.40)	-0.093 (0.16)
Sovereign Risk	-0.641*** (0.08)	-0.641*** (0.08)	-0.885*** (0.15)	-0.146 (0.09)
Sovereign Export	-0.093*** (0.01)	-0.093*** (0.01)	-0.143*** (0.02)	-0.055*** (0.01)
LTRO-Bank Relation <i>Pre-LTRO</i>	Y	Y	Y	Y
Time FE	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y
<i>R</i> -square	0.774	0.774	0.755	0.807
<i>N</i>	6342	6342	2488	3820





Fiscal vs. Monetary Policies

25

- “If countries don’t tackle **fiscal problems**, monetary policy will become **utterly irrelevant**”
—former Federal Reserve Chairman Alan Greenspan, 2015/09/04
- “Monetary policy has exhausted its influence, that is why we are so keen on **tax arrangements that support investment**”



—Scott Morrison, Treasurer of Australia, 2016/10/30



Run Out of Magic?

26

- 2016/09/08, Mario Draghi: “there are **limits to monetary policy**”
 - “we have numbers showing **the impact of our monetary policy on growth** and inflation over the forecast horizon. I think – but I should check – because I don't remember them exactly – I think it's 0.5% over the forecast horizon as far as growth is concerned, and I think it's 0.3% as far as inflation. Or – but we'll have to check that. Let me do this. I'll check and let you know after. Or it's 0.3% and 0.5% – it's either – over the forecast horizon, from now. I think we should be able to give you full figures in a moment.”
 - “It's an accumulated upward impact on GDP growth of 0.6% over the projection horizon”
- “... elected governments that have the money should be spending more ... to start and grow a business.”
- “... it is now up to **governments** to break out of the vicious circle”



Fiscal-Monetary Policy Interactions

27

Dixit and Lambertini (2003 *AER*):

- “[fiscal and monetary policy interactions] can lead to very different macroeconomic outcomes than those predicted by the analysis of one policy in isolation”

The heterogeneity in Eurozone fiscal policies provides a good setting for analysis!



Fiscal Policies

28

	Investments	Investments	Investments	Investments	Investments	
	Sample: All Eurozone Firms (1)	Increased Corp. Tax (2)	Unchanged Corp. Tax (3)	Decreased Corp. Tax (4)	Increased Gov. Inv. (5)	Decreased Gov. Inv. (6)
Country LTRO Uptake	-0.791*** (0.19)	-4.222** (1.89)	-1.259*** (0.26)	16.314** (6.74)	3.241*** (0.55)	-1.212*** (0.23)
Cash Flow	0.000 (0.00)	-0.010** (0.00)	0.000 (0.00)	0.018*** (0.00)	-0.001 (0.00)	0.001 (0.00)
Market to Book	0.005*** (0.00)	0.004*** (0.00)	0.005*** (0.00)	0.005*** (0.00)	0.003*** (0.00)	0.006*** (0.00)
Firm Size	0.619*** (0.05)	-0.029 (0.10)	0.755*** (0.08)	0.811*** (0.12)	0.086 (0.09)	0.898*** (0.07)
Leverage	-0.007*** (0.00)	-0.001 (0.00)	-0.011*** (0.00)	-0.001 (0.00)	0.003 (0.00)	-0.014*** (0.00)
Rated	0.198 (0.17)	-0.135 (0.26)	0.174 (0.25)	0.635 (0.56)	-0.264 (0.27)	0.457* (0.23)
Sovereign Risk	-0.504*** (0.03)	-1.268*** (0.27)	-0.242*** (0.08)	-0.613*** (0.05)	-0.461*** (0.05)	-0.475*** (0.07)
Sovereign Export	-0.047*** (0.00)	0.022 (0.10)	0.058*** (0.02)	-0.097*** (0.01)	-0.121*** (0.01)	-0.008 (0.01)
Time FE	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y
R-square	0.665	0.743	0.649	0.598	0.677	0.657
N	42029	12243	21525	8261	19297	22732



LTRO and Investment

29

- Did LTRO cause investment reduction?
- When would LTRO be most effective?



Eurozone vs. Non-Eurozone (“counterfactual”)

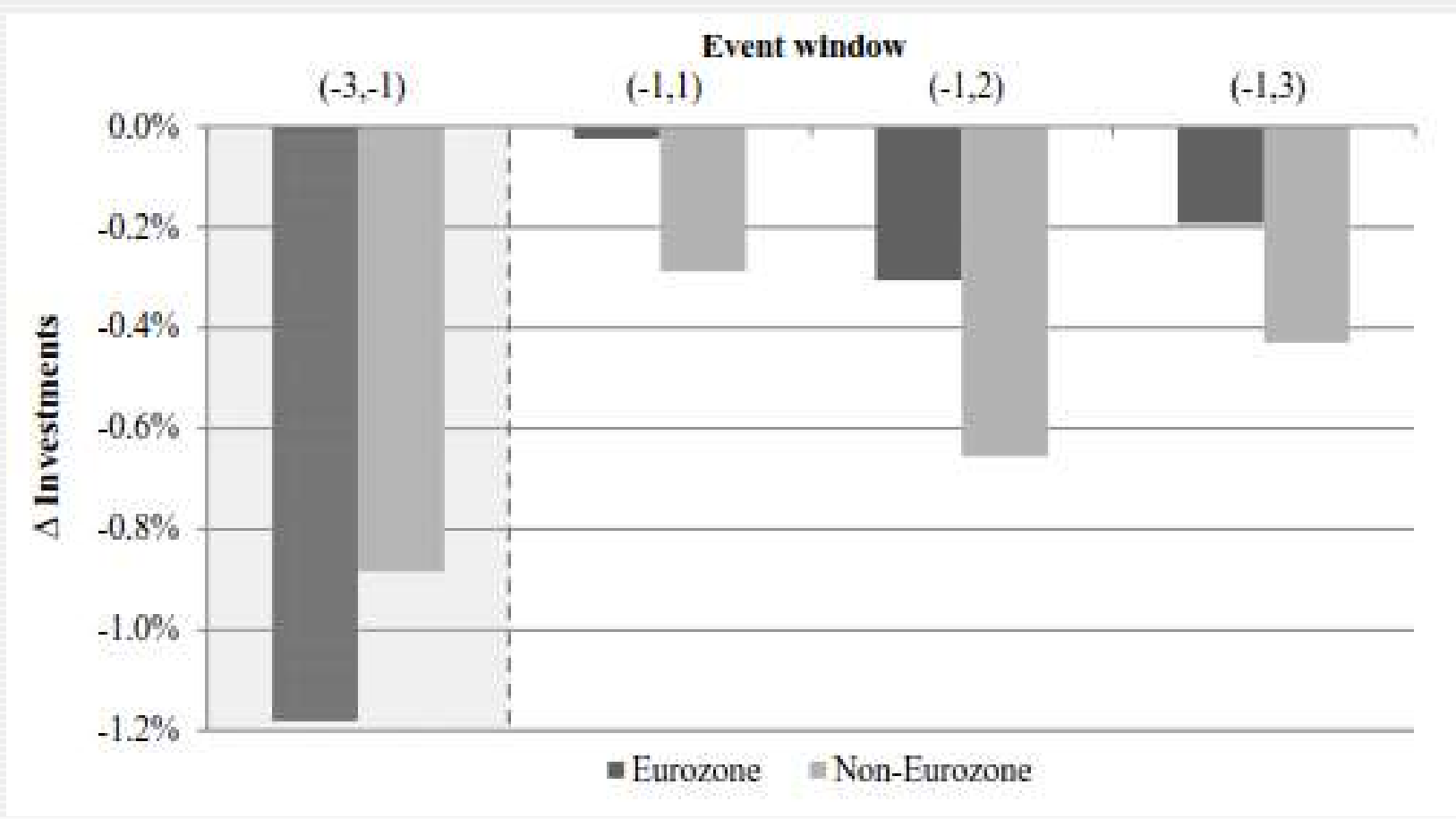
30

- Even though non-Eurozone was not subject to LTRO directly, they have their own interventions
- 2016/08/04: the **Bank of England**’s Monetary Policy Committee voted to introduce a package of measures to support growth and achieve a sustainable return of inflation to the target:
 - a 25bp cut in Bank Rate to 0.25%;
 - a new Term Funding Scheme to reinforce the pass-through of the cut in Bank Rate;
 - the purchase of up to £10bn of UK corporate bonds, financed by the creation of central bank reserves;
 - an expansion of UK government bond purchases by £60bn to £435bn, also financed by the creation of central bank reserves.



Eurozone and non-EZ before and after LTRO

31





Eurozone vs Non-EZ

	Investments		
	Investments (1)	Risky Sovereign (2)	Safe Sovereign (3)
Post-LTRO	-1.534*** (0.10)	-1.580*** (0.21)	-1.206*** (0.10)
Post-LTRO × Eurozone	0.541*** (0.04)	0.373*** (0.10)	0.379*** (0.06)
Cash Flow	-0.005*** (0.00)	0.009*** (0.00)	-0.011*** (0.00)
Market to Book	0.003*** (0.00)	0.009*** (0.00)	0.002*** (0.00)
Firm Size	0.423*** (0.04)	0.896*** (0.09)	0.299*** (0.04)
Leverage	-0.007*** (0.00)	-0.007** (0.00)	-0.006*** (0.00)
Rated	-0.218 (0.17)	-0.452 (0.36)	-0.050 (0.19)
Sovereign Risk	-0.403*** (0.03)	-0.180*** (0.05)	-0.230*** (0.04)
Sovereign Export	-0.001 (0.00)	0.116*** (0.01)	0.014 (0.00)
Eurozone FE	Y	Y	Y
Time FE	Y	Y	Y
Firm FE	Y	Y	Y
<i>R</i> -square	0.668	0.602	0.702
<i>N</i>	78606	20477	55819





Summary and Conclusions

33

- Corporate investments do not increase with LTRO
 - Especially for risky banks
 - Monetary transmission does not guarantee growth
- Firms that obtained new loans increase investment
- Early **repayment** is associated with more investment
- LTRO reveals bank health
- May need **fiscal policies** to spark corporate investments
- Negative credit supply shocks decrease investments, but liquidity injections may not boost investment
- Caveat: non-Eurozone of EU fared even worse
 - LTRO might have halted the deterioration of investment