THE TWENTY-SECOND DUBROVNIK ECONOMIC CONFERENCE

Organized by the Croatian National Bank

Annalisa Ferrando, Alexander Popov and Gregory F. Udell

Sovereign Stress, Unconventional Monetary Policy, and SMEs' Access to Finance

Hotel "Grand Villa Argentina"

Dubrovnik

June 12 – 14, 2016

Draft version

Please do not quote

Sovereign Stress, Non-conventional Monetary Policy, and SME Access to Finance

Annalisa Ferrando, Alexander Popov and Gregory F. Udell

22nd Dubrovnik Economic Conference

June 12 – June 14, 2016

KELLEY SCHOOL OF BUSINESS

INDIANA UNIVERSITY

Presentation Overview

- Motivation and overview
- Preview of findings
- Related Literature
- Context
- Data
- Empirical strategy
- Results
- Conclusion

Motivation

1. Examine how sovereign stress affected SME access to finance
2. Examine how unconventional monetary policy affected SME access to finance - specifically the Outright Monetary Transactions (OMT) Program (announced August 12, 2012)
3. Examine how sovereign stress and the OMT affected capital structure

Overview

- **We investigate these issues on three separate dimensions:**

  1. **We study the evolution of credit constraints on SMEs**
     - **before and after the sovereign debt crisis**
     - **before and after the announcement of the OMT program**
  2. **We study which firms were most affected by the these two events in terms of the creditworthiness**
  3. **We study how SME use of alternative funding sources responded to changes in their access to credit**

Preview of Results

Sovereign Stress

- Sovereign stress results in a strong supply-driven reduction in SME credit access. Specifically we find evidence of both quantity and price rationing by banks.
- Firms in stressed countries get less funding than requested
- Firms in stressed countries more likely to reject loans due to high cost of credit
- Credit rationing is not associated with a flight to quality
- Firms have difficulty adjusting to declining credit availability

Announcement of OMT program

- Has an immediate positive effect on credit access
- Appears to have benefited stronger firms more
- Firms tend to shift away from more expensive credit sources

Related Literature

- **Lender shocks, access to credit, and identification (e.g., Peek and Rosengren 1997, Chava and Purnanandam 2011, Carbo-Valverde et al., 2015, Jimenez et al. 2012, Iyer et al. 2014, Popov and Udell 2012, Beck et al. 2014, Pigini et al. 2014, Presbitero et al. 2014)**
- **The effect of the Euro area sovereign debt crisis on bank lending (e.g., Correa, Sapriza, and Zlate, 2012; Ivashina et al., 2012; Bofondi et al., 2014; DeMarco, 2014; Popov and Van Horen, 2015, Bedendo and Colla, 2014, Adelino and Ferreira, 2014)**
- **Monetary policy, the real economy, and asset prices (e.g., Gertler and Gilchrist 1994, Giannone et al. 2012, Krishnamurty and Vissing-Jorgensen, BPEA 2011, Eser and Schwaab 2013, Ghysels et al. 2014)**

Related Literature

- **Lender shocks, access to credit, and identification (e.g., Peek and Rosengren 1997, Chava and Purnanandam 2011, Carbo-Valverde et al., 2015, Jimenez et al. 2012, Iyer et al. 2014, Popov and Udell 2012, Beck et al. 2014, Pigini et al. 2014, Presbitero et al. 2014)**
- **The effect of the Euro area sovereign debt crisis on bank lending (e.g., Correa, Sapriza, and Zlate, 2012; Ivashina et al., 2012; Bofondi et al., 2014; DeMarco, 2014; Popov and Van Horen, 2015, Bedendo and Colla, 2014, Adelino and Ferreira, 2014)**
- **Monetary policy, the real economy, and asset prices (e.g., Gertler and Gilchrist 1994, Giannone et al. 2012, Krishnamurty and Vissing-Jorgensen, BPEA 2011, Eser and Schwaab 2013, Ghysels et al. 2014)**

  - **Our paper: examines impact of sovereign debt crisis on small firms;**
  - **examines the impact of the OMT on firm access to finance;**
  - **examines price as well as quantity effects;**
  - **and, examines overall SME capital structure effects.**

Context – The European Environment

- Debt crisis a multidimensional shock to the European model
- Economic shock
  - Between 2010:Q2 and 2012:Q3, GDP contracted by 16% in Greece
  - Unemployment rate in Spain is 26%, youth unemployment rate is 57%
  - A number of countries lost access to bond markets
- Political shock
  - Angela Merkel the only PM in 2010 still in power in 2014
  - Rise of radical parties in both national and European elections
- Cultural shock
  - Eurovision Song Contest voting patterns shifted since 2010
    - indebted countries more likely to vote for each other (Garcia and Tanase 2013)
    - “Eurovision metric” can predict government bond yields

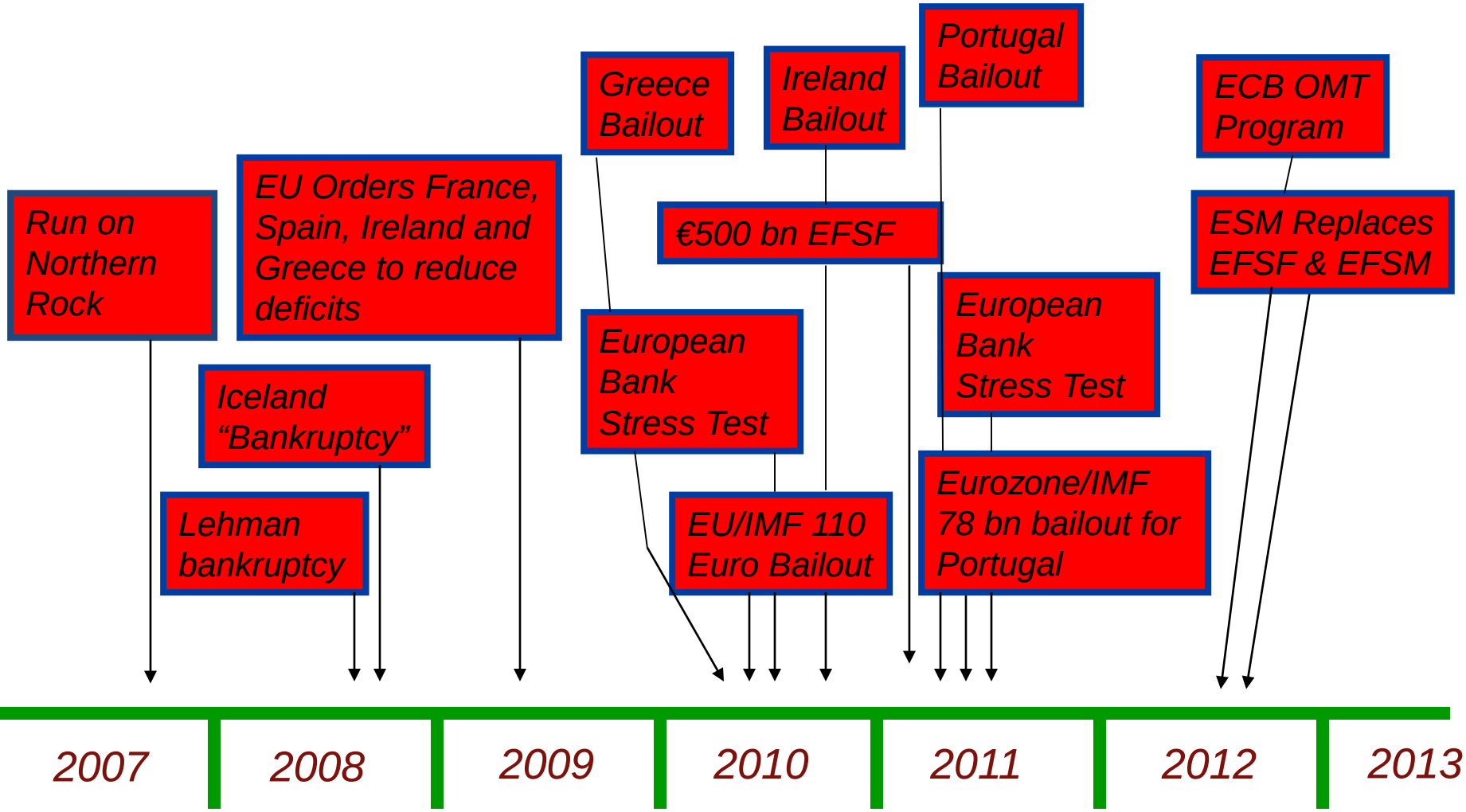
Context: Sovereign Debt Crisis

- 5 euro area countries (Greece, Ireland, Italy, Portugal, and Spain) suffered significant deterioration in their creditworthiness
  - 10-year bond yields soared in 2010: 1210 bp (Greece), 950 bp (Ireland), 470 bp (Italy), 750 bp (Portugal), 550 bp (Spain)
    - vs. 340 for non-stressed euro area countries
  - Because banks hold significant amounts of domestic sovereign debt, this shock to banks could significantly affect SME access to finance
    - via direct balance sheet effect due to sovereign debt downgrades (Gertler and Kiyotaki 2010)
    - via impairment of sovereign debt as collateral in wholesale funding
  - Sovereign stress could also reduce the implicit guarantees issued by governments to their banking systems (Demirguc-Kunt and Uzinga 2013)

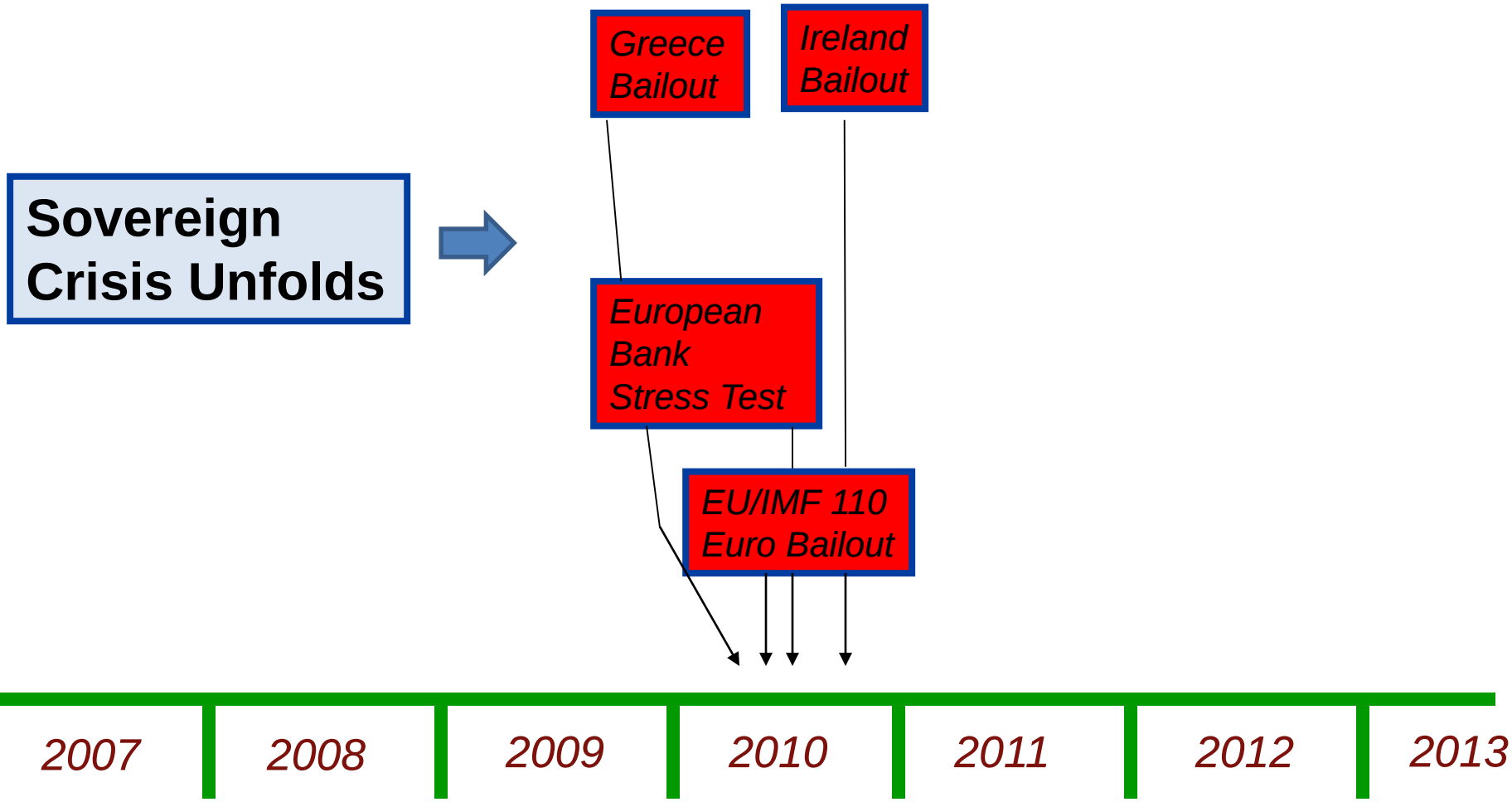
Context: The OMT Program

- **In terms of scale, the most important unconventional monetary policy employed in the Euro area since its inception.**
  - **Preceded by the Security Markets Program (SMP) in May 2010, and the ECB lending programs in December 2010 and February 2012.**
  - **Draghi vows that ECB would do "whatever it takes" (July 26, 2012)**
  - **Under the OMT the ECB announced in August 2012 that it would undertake outright transactions in secondary sovereign bond markets *aimed at safeguarding an appropriate monetary policy transmission and the singleness of monetary policy.***
    - **The ECB set no *ex ante* quantitative limits on the program**
    - **Set three conditions on countries seeking access to the program**
      1. **Must request financial assistance from EFSF**
      2. **EU and/or IMF must approve and lay out terms of a deficit reduction program**
      3. **Country must agree to program**

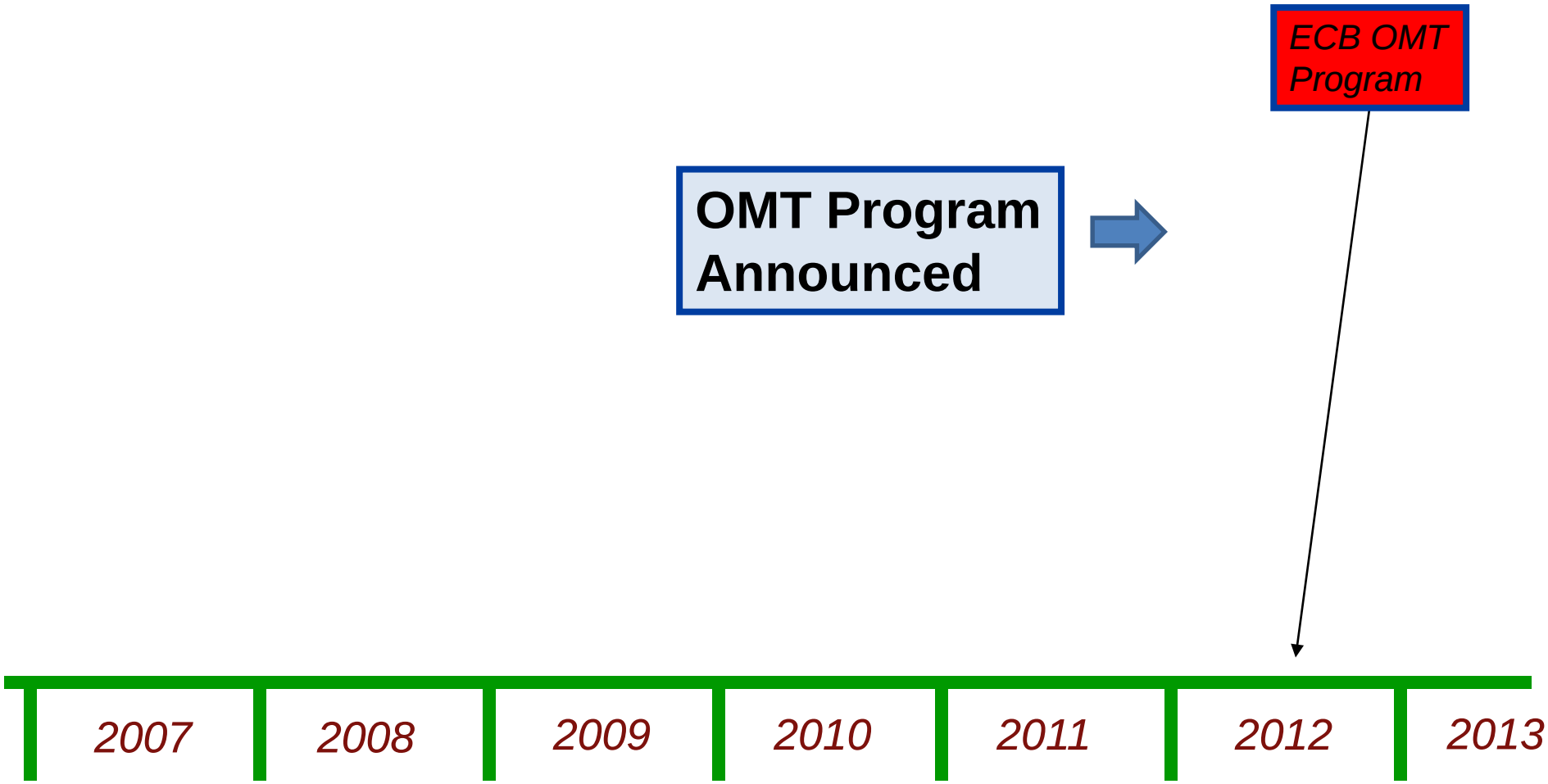
EUROPE CRISIS TIMELINE



EUROPE CRISIS TIMELINE



EUROPE CRISIS TIMELINE



Context – SMEs in Europe

- SMEs - disproprtionate share of economic activity in Europe
  - SME: ≤ 250 employees, ≤ €50 million sales
  - 99% of businesses, 2/3 private sector jobs, 50%+ of value added
  - 90% of SMEs are micro firms (≤ 10 employees)
- SMEs depend on bank funding for investment decisions
  - 55% use bank credit to finance “specific projects or investments” (ECB‘s SAFE, 2014)
  - 31% use retained earnings, 6% use equity, and 2% use debt securities
- Stressed countries: collapse in industrial activity and rising unemployment
  - Ability of SMEs to access external financing one possible channel
- Effect of OMT on bond yields (Altavilla et al., 2014)
  - Effect on small firms?

Context – SMEs in Europe

- SMEs - disproprtionate share of economic activity in Europe
  - SME: ≤ 250 employees, ≤ €50 million sales
  - 99% of businesses, 2/3 private sector jobs, 50%+ of value added
  - 90% of SMEs are micro firms (≤ 10 employees)
- SMEs depend on bank funding for investment decisions
  - 55% use bank credit to finance "specific projects or investments" (ECB's SAFE, 2014)
  - 31% use retained earnings, 6% use equity, and 2% use debt securities
- Stressed countries: collapse in industrial activity and rising unemployment
  - Ability of SMEs to access external financing one possible channel
- Effect of OMT on bond yields (Altavilla et al., 2014)
  - Effect on small firms?

The SAFE Data

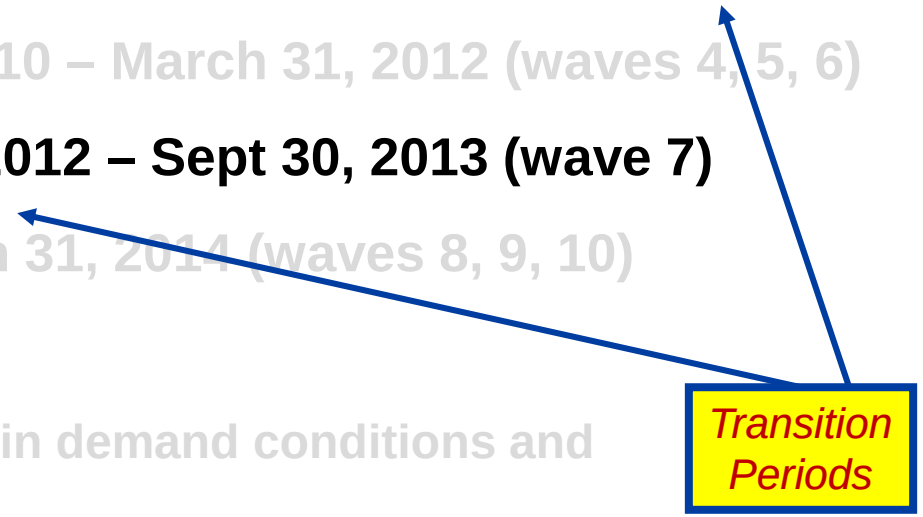
- **Firm-level data from the ECB and European Commission Survey on the Access of Finance of SMEs (SAFE)**
  - **Firms interviewed bi-annually over a period of 6 months**
    - **10 waves have been conducted**
  - **Each SAFE wave interviews approximately 4,500 firms in 11 euro area countries**
    - **5 stressed: Greece, Ireland, Italy, Portugal, Spain**
    - **6 non-stressed: Austria, Belgium, Finland, France, Germany, Netherlands**
    - **We drop firms from Croatia, Cyprus, Malta, Slovakia, and Slovenia (too few, timing)**
  - **44,739 firms, 68,796 observations**

The SAFE Data (cont.)

- ***Sovereign debt crisis*** **and the** ***OMT announcement***
  - **Pre-crisis: Jan 1, 2009 – Dec 31, 2009 (waves 1 and 2)**
  - **Sovereign debt crisis unfolds: April 1, 2010 – Sept 30, 2010 (wave 3)**
  - **Post-crisis/Pre-OMT: Oct 1, 2010 – March 31, 2012 (waves 4, 5, 6)**
  - **OMT announcement: April 1, 2012 – Sept 30, 2013 (wave 7)**
  - **Post-OMT: Oct 1, 2012 – March 31, 2014 (waves 8, 9, 10)**
  - Balance sheet data
    - Size, age, ownership, changes in demand conditions and creditworthiness
  - Financing data
    - Credit constrained, use of retained earnings / equity / debt securities / trade credit / subsidies / other loans

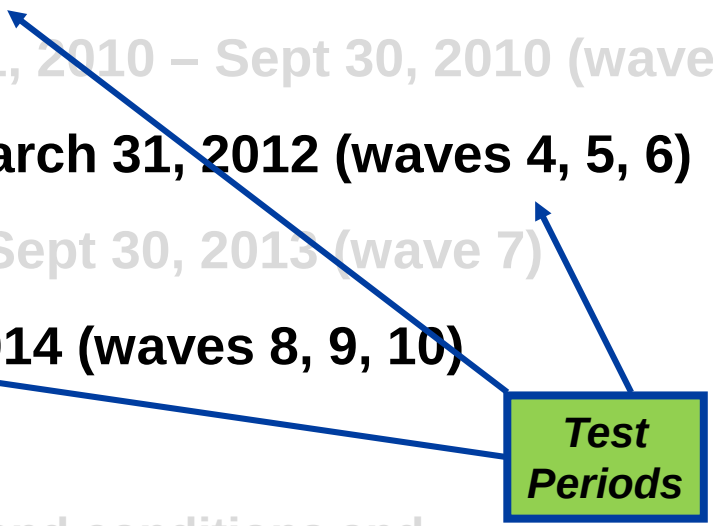
The SAFE Data (cont.)

- ***Sovereign debt crisis*** **and the** ***OMT announcement***
  - Pre-crisis: Jan 1, 2009 – Dec 31, 2009 (waves 1 and 2)
  - **Sovereign debt crisis unfolds: April 1, 2010 – Sept 30, 2010 (wave 3)**
  - Post-crisis/Pre-OMT: Oct 1, 2010 – March 31, 2012 (waves 4, 5, 6)
  - **OMT announcement: April 1, 2012 – Sept 30, 2013 (wave 7)**
  - Post-OMT: Oct 1, 2012 – March 31, 2014 (waves 8, 9, 10)
  - Balance sheet data
    - Size, age, ownership, changes in demand conditions and creditworthiness
  - Financing data
    - Credit constrained, use of retained earnings / equity / debt securities / trade credit / subsidies / other loans

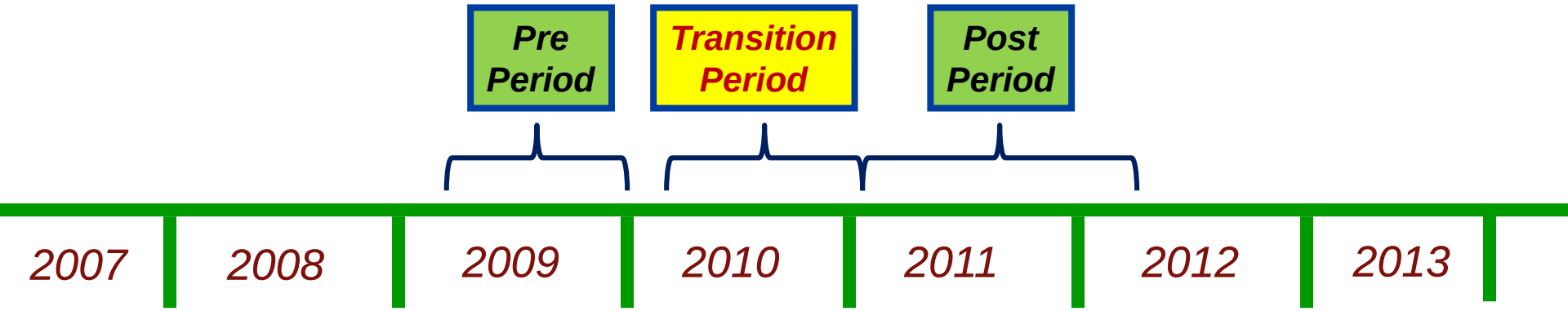


The SAFE Data (cont.)

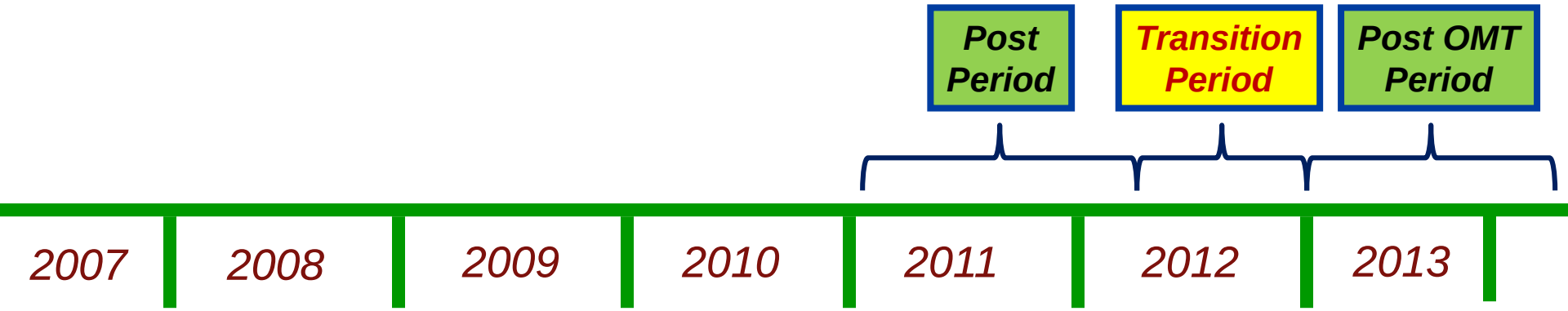
- ***Sovereign debt crisis*** **and the** ***OMT announcement***
  - **Pre-crisis: Jan 1, 2009 – Dec 31, 2009 (waves 1 and 2)**
  - Sovereign debt crisis unfolds: April 1, 2010 – Sept 30, 2010 (wave 3)
  - **Post-crisis/Pre-OMT: Oct 1, 2010 – March 31, 2012 (waves 4, 5, 6)**
  - OMT announcement: April 1, 2012 – Sept 30, 2013 (wave 7)
  - **Post-OMT: Oct 1, 2012 – March 31, 2014 (waves 8, 9, 10)**
  - Balance sheet data
    - Size, age, ownership, changes in demand conditions and creditworthiness
  - Financing data
    - Credit constrained, use of retained earnings / equity / debt securities / trade credit / subsidies / other loans



TIMELINE – SOVEREIGN DEBT TESTS



TIMELINE – OMT TESTS



The SAFE Data (cont.)

- ***Sovereign debt crisis*** **and the** ***OMT announcement***
  - Pre-crisis: Jan 1, 2009 – Dec 31, 2009 (waves 1 and 2)
  - Sovereign debt crisis unfolds: April 1, 2010 – Sept 30, 2010 (wave 3)
  - Post-crisis/Pre-OMT: Oct 1, 2010 – March 31, 2012 (waves 4, 5, 6)
  - OMT announcement: April 1, 2012 – Sept 30, 2013 (wave 7)
  - Post-OMT: Oct 1, 2012 – March 31, 2014 (waves 8, 9, 10)
  - **Balance sheet data**
    - **Size, age, ownership, changes in demand conditions and creditworthiness**
  - Financing data
    - Rejected, discouraged, use of retained earnings / equity / debt securities / trade credit / subsidies / other loans

The SAFE Data (cont.)

- ***Sovereign debt crisis*** **and** ***OMT announcement***
  - Pre-crisis: Jan 1, 2009 – Dec 31, 2009 (waves 1 and 2)
  - Sovereign debt crisis unfolds: April 1, 2010 – Sept 30, 2010 (wave 3)
  - Post-crisis/Pre-OMT: Oct 1, 2010 – March 31, 2012 (waves 4, 5, 6)
  - OMT announcement: April 1, 2012 – Sept 30, 2013 (wave 7)
  - Post-OMT: Oct 1, 2012 – March 31, 2014 (waves 8, 9, 10)
  - Balance sheet data
    - Size, age, ownership, changes in demand conditions and creditworthiness
  - **Financing data**
    - **Credit constrained, use of retained earnings / equity / debt securities / trade credit / subsidies / other loans**

The SAFE Data (cont.)

- ***Sovereign debt crisis*** **and** ***OMT announcement***
  - Pre-crisis: Jan 1, 2009 – Dec 31, 2009 (waves 1 and 2)
  - Sovereign debt crisis unfolds: April 1, 2010 – Sept 30, 2010 (wave 3)
  - Post-crisis/Pre-OMT: Oct 1, 2010 – March 31, 2012 (waves 4, 5, 6)
  - OMT announcement: Apr
  - Post-OMT: Oct 1, 2012 – M
  - Balance sheet data
    - Size, age, ownership, cha
      creditworthiness

Specifically:
- Demand for credit?
- Credit constrained if:
a) application denied
b) rate too high
c) received < 75% of request
d) discouraged from applying

- **Financing data**
  - **Credit constrained, use of retained earnings / equity / debt securities / trade credit / subsidies / other loans**

Table 1. Summary statistics

Variable	Observations	Mean
Access to finance		
Credit constrained	26247	0.35
Loan application denied	22089	0.10
Rationed	22089	0.13
Refused due to high cost	22089	0.02
Discouraged from applying	26247	0.16
Bank loans and credit lines	68395	0.57
Equity	68129	0.07
Retained earnings	68068	0.35
Debt securities	67823	0.02
Trade credit	68301	0.32
Grants or subsidies	68298	0.17
Other loans	68345	0.17

Table 1. Summary statistics

Variable	Observations	Mean
Access to finance		
Credit constrained	26247	0.35
Loan application denied	22089	0.10
Rationed	22089	0.13
Refused due to high cost	22089	0.02
Discouraged from applying	26247	0.16
Bank loans and credit lines	68395	0.57
Equity	68129	0.07
Retained earnings	68068	0.35
Debt securities	67823	0.02
Trade credit	68301	0.32
Grants or subsidies	68298	0.17
Other loans	68345	0.17

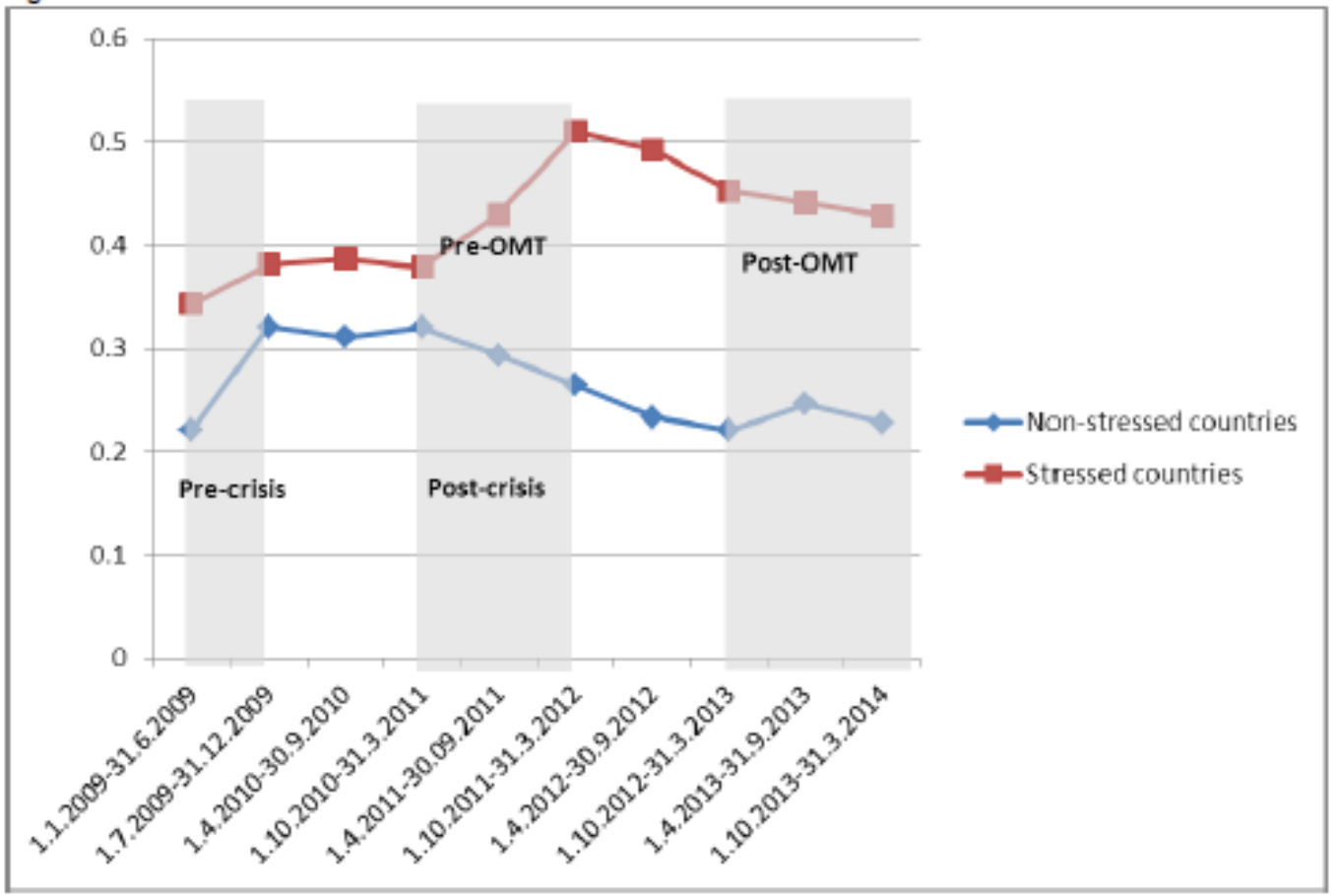
Firms with positive demand for credit

Table 1. Summary statistics

Variable	Observations	Mean
Access to finance		
Credit constrained	26247	0.35
Loan application denied	22089	0.10
Rationed	22089	0.13
Refused due to high cost	22089	0.02
Discouraged from applying	26247	0.16
Bank loans and credit lines	68395	0.57
Equity	68129	0.07
Retained earnings	68068	0.35
Debt securities	67823	0.02
Trade credit	68301	0.32
Grants or subsidies	68298	0.17
Other loans	68345	0.17

Firm capital structure

Figure 1. Credit constrained firms across stressed and non-stressed countries



Note: The Chart summarizes weighted averages of credit constrained firms over the sample period. 'Credit constrained' is a dummy variable equal to 1 if the firm declared a positive demand for bank financing in the past 6 months, but it did not apply because of possible rejection, it applied and its loan application was rejected, it applied and got less than 75% of the requested amount, or it refused the loan because the cost was too high.

Table 2. Credit constraints, by country and time period

Country	Credit constrained		
	1st January 2009 – 31st December 2010 (waves 1-3)	1st October 2011 – 31st March 2012 (waves 4-6)	1st October 2012 – 31st March 2014 (waves 8-10)
Stressed			
Spain	0.52	0.48	0.44
Greece	0.52	0.65	0.70
Ireland	0.47	0.57	0.53
Italy	0.39	0.39	0.40
Portugal	0.43	0.45	0.44
Total	0.46	0.48	0.44
Non-stressed			
Austria	0.23	0.19	0.15
Belgium	0.39	0.29	0.31
Germany	0.32	0.21	0.12
Finland	0.22	0.23	0.30
France	0.25	0.30	0.31
Netherlands	0.65	0.56	0.55
Total	0.33	0.27	0.23

Note: This table presents summary statistics, by country and time period, of the probability of the firm's loan application being rejected by the bank. Summary statistics are weighted means. 'Credit constrained' is a dummy variable equal to 1 if the firm declared a positive demand for bank financing in the past 6 months, but it was discouraged from applying because it believed it would be rejected, or it applied but its loan application was denied, or it applied and got less than 75% of the requested amount, or it refused the loan because the cost was too high.

Table 2. Credit constraints, by country and time period

Country	Credit constrained		
	1st January 2009 – 31st December 2010 (waves 1-3)	1st October 2011 – 31st March 2012 (waves 4-6)	1st October 2012 – 31st March 2014 (waves 8-10)
Stressed			
Spain	0.52	0.48	0.44
Greece	0.52	0.65	0.70
Ireland	0.47	0.57	0.53
Italy	0.39	0.39	0.40
Portugal	0.43	0.45	0.44
Total	0.46	0.48	0.44
Non-stressed			
Austria	0.23	0.19	0.15
Belgium	0.39	0.29	0.31
Germany	0.32	0.21	0.12
Finland	0.22	0.23	0.30
France	0.25	0.30	0.31
Netherlands	0.65	0.56	0.55
Total	0.33	0.27	0.23

46% v. 33%

Note: This table presents summary statistics, by country and time period, of the probability of the firm's loan application being rejected by the bank. Summary statistics are weighted means. 'Credit constrained' is a dummy variable equal to 1 if the firm declared a positive demand for bank financing in the past 6 months, but it was discouraged from applying because it believed it would be rejected, or it applied but its loan application was denied, or it applied and got less than 75% of the requested amount, or it refused the loan because the cost was too high.

Table 2. Credit constraints, by country and time period

Country	Credit constrained		
	1st January 2009 – 31st December 2010 (waves 1-3)	1st October 2011 – 31st March 2012 (waves 4-6)	1st October 2012 – 31st March 2014 (waves 8-10)
Stressed			
Spain	0.52	0.48	0.44
Greece	0.52	0.65	0.70
Ireland	0.47	0.57	0.53
Italy	0.39	0.39	0.40
Portugal	0.43	0.45	0.44
Total	0.46	0.48	0.44
Non-stressed			
Austria	0.23	0.19	0.15
Belgium	0.39	0.29	0.31
Germany	0.32	0.21	0.12
Finland	0.22	0.23	0.30
France	0.25	0.30	0.31
Netherlands	0.65	0.56	0.55
Total	0.33	0.27	0.23

50% v. 29%

Note: This table presents summary statistics, by country and time period, of the probability of the firm's loan application being rejected by the bank. Summary statistics are weighted means. 'Credit constrained' is a dummy variable equal to 1 if the firm declared a positive demand for bank financing in the past 6 months, but it was discouraged from applying because it believed it would be rejected, or it applied but its loan application was denied, or it applied and got less than 75% of the requested amount, or it refused the loan because the cost was too high.

Table 2. Credit constraints, by country and time period

Country	Credit constrained		
	1st January 2009 – 31st December 2010 (waves 1-3)	1st October 2011 – 31st March 2012 (waves 4-6)	1st October 2012 – 31st March 2014 (waves 8-10)
Stressed			
Spain	0.52	0.48	0.44
Greece	0.52	0.65	0.70
Ireland	0.47	0.57	0.53
Italy	0.39	0.39	0.40
Portugal	0.43	0.45	0.44
Total	0.46	0.48	0.44
Non-stressed			
Austria	0.23	0.19	0.15
Belgium	0.39	0.29	0.31
Germany	0.32	0.21	0.12
Finland	0.22	0.23	0.30
France	0.25	0.30	0.31
Netherlands	0.65	0.56	0.55
Total	0.33	0.27	0.23

49% v. 28%

Note: This table presents summary statistics, by country and time period, of the probability of the firm's loan application being rejected by the bank. Summary statistics are weighted means. 'Credit constrained' is a dummy variable equal to 1 if the firm declared a positive demand for bank financing in the past 6 months, but it was discouraged from applying because it believed it would be rejected, or it applied but its loan application was denied, or it applied and got less than 75% of the requested amount, or it refused the loan because the cost was too high.

Table 2. Credit constraints, by country and time period

Country	Credit constrained		
	1st January 2009 – 31st December 2010 (waves 1-3)	1st October 2011 – 31st March 2012 (waves 4-6)	1st October 2012 – 31st March 2014 (waves 8-10)
Stressed			
Spain	0.52	0.48	0.44
Greece	0.52	0.65	0.70
Ireland	0.47	0.57	0.53
Italy	0.39	0.39	0.40
Portugal	0.43	0.45	0.44
Total	0.46	0.48	0.44
Non-stressed			
Austria	0.23	0.19	0.15
Belgium	0.39	0.29	0.31
Germany	0.32	0.21	0.12
Finland	0.22	0.23	0.30
France	0.25	0.30	0.31
Netherlands	0.65	0.56	0.55
Total	0.33	0.27	0.23

Note Germany may be different

Note: This table presents summary statistics, by country and time period, of the probability of the firm's loan application being rejected by the bank. Summary statistics are weighted means. 'Credit constrained' is a dummy variable equal to 1 if the firm declared a positive demand for bank financing in the past 6 months, but it was discouraged from applying because it believed it would be rejected, or it applied but its loan application was denied, or it applied and got less than 75% of the requested amount, or it refused the loan because the cost was too high.

Empirical Strategy

$$\Pr ob(Credit\_constrained_{isct} = 1) = \varphi(\beta_1 Post_t \times Stressed_{isc} + \beta_2 X_{isct} + \beta_3 \phi_{sc} + \beta_4 \eta_t + \varepsilon_{isct}) \quad (1)$$

$Credit\_constrained_{isct}$ = 1 if firm *I* in sector *s* in country *c* at time *t:*

- applied for a bank loan or credit line in the past 6 months and was denied credit;
- got less than 75% of the amount it requested;
- did not apply because it expected to be denied credit.

$Post_t$ = 1 after sovereign debt crisis

$Stressed_t$ = 1 if firm is in Greece, Ireland, Italy, Portugal, or Spain

X_{isct} is a vector o time varying firm-specific controls (size, age, turnover, demand, etc.)

ϕ_{sc} is a vector of country-sector fixed effects (e.g., Construction in Spain)

η_t is a vector of time fixed effects

ε_{isct} is an idiosyncratic error

Expect $\beta_1 > 0$ after sovereign debt crisis started, $\beta_1 < 0$ after OMT announcement

Empirical Strategy

$$\Pr ob(Credit\_constrained_{isct} = 1) = \phi(\beta_1 Post_t \times Stressed_{isc} + \beta_2 X_{isct} + \beta_3 \phi_{sc} + \beta_4 \eta_t + \varepsilon_{isct}) \quad (1)$$

Sovereign Tests: β_1 captures in DID sense change in access to finance

$Credit\_constrained_{isct}$ = 1 if firm *I* in sector *s* in c

- applied for a bank loan or credit line in the past 6 months and was denied credit;
- got less than 75% of the amount it requested;
- did not apply because it expected to be denied credit.

$Post_t$ = 1 after sovereign debt crisis

$Stressed_t$ = 1 if firm is in Greece, Ireland, Italy, Portugal, or Spain

X_{isct} is a vector o time varying firm-specific controls (size, age, turnover, demand, etc.)

ϕ_{sc} is a vector of country-sector fixed effects (e.g., Construction in Spain)

η_t is a vector of time fixed effects

ε_{isct} is an idiosyncratic error

Expect $\beta_1 > 0$ after sovereign debt crisis started, $\beta_1 < 0$ after OMT announcement

Empirical Strategy

$$\Pr ob(Credit\_constrained_{isct} = 1) = \varphi(\beta_1 Post\_OMT_t \times Stressed_{isc} + \beta_2 X_{isct} + \beta_3 \varphi_{sc} + \beta_4 \eta_t + \varepsilon_{isct}) \quad (2)$$

$Credit\_constrained_{isct}$ = 1 if firm *I* in sector *s* in country *c* at time *t:*

- applied for a bank loan or credit line in the past 6 months and was denied credit;
- got less than 75% of the amount it requested;
- did not apply because it expected to be denied credit.

$Post\_OMT_t$ = 1 after OMT announcement

$Stressed_t$ = 1 if firm is in Greece, Ireland, Italy, Portugal, or Spain

X_{isct} is a vector o time varying firm-specific controls (size, age, turnover, demand, etc.)

ϕ_{sc} is a vector of country-sector fixed effects (e.g., Construction in Spain)

η_t is a vector of time fixed effects

ε_{isct} is an idiosyncratic error

Expect $\beta_1 > 0$ after sovereign debt crisis started, $\beta_1 < 0$ after OMT announcement

Empirical Strategy

$$\Pr ob(Credit\_constrained_{isct} = 1) = \varphi(\beta_1 Post\_OMT_t \times Stressed_{isc} + \beta_2 X_{isct} + \beta_3 \varphi_{sc} + \beta_4 \eta_t + \varepsilon_{isct}) \quad (2)$$

OMT Tests: β_1 captures in DID sense change in access to finance

$Credit\_constrained_{isct}$ = 1 if firm *i* in sector *s* in c

- applied for a bank loan or credit line in the past 6 months and was denied credit;
- got less than 75% of the amount it requested;
- did not apply because it expected to be denied credit.

$Post\_OMT_t$ = 1 after OMT announcement

$Stressed_t$ = 1 if firm is in Greece, Ireland, Italy, Portugal, or Spain

X_{isct} is a vector o time varying firm-specific controls (size, age, turnover, demand, etc.)

ϕ_{sc} is a vector of country-sector fixed effects (e.g., Construction in Spain)

η_t is a vector of time fixed effects

ε_{isct} is an idiosyncratic error

Expect $\beta_1 > 0$ after sovereign debt crisis started, $\beta_1 < 0$ after OMT announcement

Key Results

- **Sovereign debt crisis resulted in strong supply-driven reduction in SME access to credit**
- **Rationing in both *prices* and *quantity***
- **OMT had only a short-lived effect on credit access in stressed countries**
  - **Firms less likely to be rationed or discouraged in 6 months following crisis**
  - **Firms with better prospects and better credit history benefited more**
- **Continued higher use of trade credit in stressed countries indicates residual constraints**

Main Result

Table 4. Sovereign stress and credit access

	Credit constrained	
	(1)	(2)
Stressed × Post	0.0785**	0.1234**
	(0.0396)	(0.0599)
Stand-alone firm	-0.0230	-0.0182
	(0.0165)	(0.0211)
Individual- or family-owned	0.0071	0.0072
	(0.0162)	(0.0176)
Female owner	0.0233	0.0286
	(0.0279)	(0.0283)
Size_1	0.1408***	0.1503***
	(0.0150)	(0.0148)
Size_2	0.0067	0.0029
	(0.0091)	(0.0080)
Size_4	0.0003	-0.0040
	(0.0321)	(0.0280)
Age_1	-0.0006	-0.0080
	(0.0571)	(0.0531)
Age_2	0.0608***	0.0644***
	(0.0125)	(0.0155)
Age_4	-0.0363	-0.0405
	(0.0369)	(0.0369)
Turnover_1	0.0956***	0.1068***
	(0.0324)	(0.0339)
Turnover_2	0.0479**	0.0489**
	(0.0219)	(0.0227)
Turnover_4	-0.0718*	-0.0609
	(0.0405)	(0.0378)
Outlook better	-0.0287*	-0.0261*
	(0.0152)	(0.0153)
Capital better	-0.0320	-0.0313
	(0.0224)	(0.0240)
Credit history better	-0.0762***	-0.0689***
	(0.0203)	(0.0239)
Country × Industry FEs	No	Yes
Time FEs	No	Yes
No. Observations	8916	8907
R-squared	0.08	0.11

Main Result

Table 4. Sovereign stress and credit access

	Credit constrained	
	(1)	(2)
Stressed × Post	0.0785**	0.1234**
	(0.0396)	(0.0599)
Stand-alone firm	(0.0165)	(0.0211)
Individual- or family-owned	0.0071	0.0072
	(0.0162)	(0.0176)
Female owner	0.0233	0.0286
	(0.0279)	(0.0283)
Size_1	0.1408***	0.1503***
	(0.0150)	(0.0148)
Size_2	0.0067	0.0029
	(0.0091)	(0.0080)
Size_4	0.0003	-0.0040
	(0.0321)	(0.0280)
Age_1	-0.0006	-0.0080
	(0.0571)	(0.0531)
Age_2	0.0608***	0.0644***
	(0.0125)	(0.0155)
Age_4	-0.0363	-0.0405
	(0.0369)	(0.0369)
Turnover_1	0.0956***	0.1068***
	(0.0324)	(0.0339)
Turnover_2	0.0479**	0.0489**
	(0.0219)	(0.0227)
Turnover_4	-0.0718*	-0.0609
	(0.0405)	(0.0378)
Outlook better	-0.0287*	-0.0261*
	(0.0152)	(0.0153)
Capital better	-0.0320	-0.0313
	(0.0224)	(0.0240)
Credit history better	-0.0762***	-0.0689***
	(0.0203)	(0.0239)
Country × Industry FEs	No	Yes
Time FEs	No	Yes
No. Observations	8916	8907
R-squared	0.08	0.11

Main Result

Table 4. Sovereign stress and credit access

	Credit constrained	
	(1)	(2)
Stressed × Post	0.0785**	0.1234**
	(0.0396)	(0.0599)
Stand-alone firm	(0.0165)	(0.0211)
Individual- or family-owned	0.0071	0.0072
	(0.0162)	(0.0176)
Female owner	0.0233	0.0286
	(0.0279)	(0.0283)
Size_1	0.1408***	0.1503***
	(0.0150)	(0.0148)
Size_2	0.0067	0.0029
	(0.0091)	(0.0080)
Size_4	0.0003	-0.0040
	(0.0321)	(0.0280)
Age_1	-0.0006	-0.0080
	(0.0571)	(0.0531)
Age_2	0.0608***	0.0644***
	(0.0125)	(0.0155)
Age_4	-0.0363	-0.0405
	(0.0369)	(0.0369)
Turnover_1	0.0956***	0.1068***
	(0.0324)	(0.0339)
Turnover_2	0.0479**	0.0489**
	(0.0219)	(0.0227)
Turnover_4	-0.0718*	-0.0609
	(0.0405)	(0.0378)
Outlook better	-0.0287*	-0.0261*
	(0.0152)	(0.0153)
Capital better	-0.0320	-0.0313
	(0.0224)	(0.0240)
Credit history better	-0.0762***	-0.0689***
	(0.0203)	(0.0239)
Country × Industry FEs	No	Yes
Time FEs	No	Yes
No. Observations	8916	8907
R-squared	0.08	0.11

Firm in stressed country has 22.6% higher probability of being credit constrained

Main Tests: Other Results

- **Both quantity and price rationing**
  - **Firms in stressed countries 8.6% more likely to receive less than 75% of requested amount**
  - **5% more likely to be price rationed**
  - **Also more likely to be discouraged, but not statistically significant**
- **Robustness checks**
  - **Include interaction of country and time dummies and sector and time dummies (effect bigger)**
  - **Include interaction of all firm-specific variables with the Post dummy (robust)**
  - **Control for differences in trend exploiting two pre-crisis waves (robust)**
  - **Exclusion of Greece as an outlier (robust)**

Exploiting Firm Heterogeneity

- **Hypotheses related to: *Who suffers most?***
  - ***Flight to quality*** **(e.g., Albertazzi and Marchetti 2010)**
  - ***Flight home*** **(e.g., Giannetti and Laeven 2012, Presbitero et al. 2014, Popov and Van Horen 2015)**
  - ***Gambling for resurrection*** **(=> riskiest borrowers) (Akerlof and Romer 1993, Caballero et al. 2006, De Haas and Van Horen 2013)**
- **Proxies for firm risk**
  - **Firm size**
  - **Survey responses to questions:**
    - **"Has outlook improved?"**
    - **"Has asset quality (collateral) improved?"**
- **Key results**
  - **Large firms in stressed countries *more* likely quantity rationed**
  - **Firms with better capital *more* likely price rationed**
  - **Firms with better credit history *more* likely discouraged but more likely *less* likely price rationed**

Exploiting Firm Heterogeneity

- **Hypotheses related to: *Who suffers most?***
  - ***Flight to quality*** **(e.g., Albertazzi and Marchetti 2010)**
  - ***Flight home*** **(e.g., Giannetti and Laeven 2012, Presbitero et al. 2014, Popov and Van Horen 2015)**
  - ***Gambling for resurrection*** **(=> riskiest borrowers) (Akerlof and Romer 1993, Caballero et al. 2006, De Haas and Van Horen 2013)**
- **Proxies for firm risk**
  - **Firm size**
  - **Survey responses to questions:**
    - **"Has outlook improved?"**
    - **"Has asset quality (collateral) improved?"**
- **Key results**
  - **Large firms in stressed countries *more* likely quantity rationed**
  - **Firms with better capital *more* likely price rationed**
  - **Firms with better credit history *more* likely discouraged but more likely *less* likely price rationed**

Only evidence of flight to quality

Exploiting Firm Heterogeneity

Table 7. Sovereign stress and credit access: Exploiting cross-sectional heterogeneity

	Credit constrained	Loan application denied	Rationed	Refused due to high cost	Discouraged from applying
	(1)	(2)	(3)	(4)	(5)
Stressed × Post × Size_4	0.1473**	-0.0036	0.0454*	0.0258	-0.0188
	(0.0751)	(0.0428)	(0.0290)	(0.0332)	(0.0721)
Stressed × Post × Outlook better	0.0585	0.0264	-0.0108	0.0707	0.0347
	(0.0506)	(0.0554)	(0.0322)	(0.0551)	(0.1111)
Stressed × Post × Capital better	-0.0054	0.0326	-0.0251	0.0869***	-0.0883
	(0.0633)	(0.0425)	(0.0263)	(0.0204)	(0.0545)
Stressed × Post × Credit history better	0.1878	-0.0479	0.0405	-0.0715**	0.2051*
	(0.1958)	(0.0372)	(0.0504)	(0.0300)	(0.1321)
Firm-level controls	Yes	Yes	Yes	Yes	Yes
Double interactions	Yes	Yes	Yes	Yes	Yes
Country × Industry FEs	Yes	Yes	Yes	Yes	Yes
Time × Industry FEs	Yes	Yes	Yes	Yes	Yes
No. Observations	8907	7292	6434	7439	8905
R-squared	0.11	0.14	0.07	0.04	0.11

Firm Financing

- How did firm financing patterns change in response to reduced credit access?
- Firms asked (yes/no) whether they used a wide range of funding sources: *bank loans, equity, retained earnings, corporate bonds and debt securities, trade credit, and government subsidies*
- Results:
  - Firms used more debt securities (statistically sig)
  - More retained earnings, less equity, more trade credit, more subsidies (none statistically sig)
- Thus, it appears that because of sovereign crisis
  - overall financing available declined, and
  - likely overall cost of finance increased

Firm Financing

Table 8. Sovereign stress and alternative sources of firm financing

	Retained earnings	Equity	Debt securities	Trade credit	Grants or subsidies	Other loans
	(1)	(2)	(3)	(4)	(5)	(6)
Stressed × Post	0.1029	-0.0016	0.0142**	0.0082	0.0037	-0.0163
	(0.1265)	(0.0189)	(0.0083)	(0.0728)	(0.0570)	(0.0267)
Firm-specific controls	Yes	Yes	Yes	Yes	Yes	Yes
Country × Industry FEs	Yes	Yes	Yes	Yes	Yes	Yes
Time × Industry FEs	Yes	Yes	Yes	Yes	Yes	Yes
No. Observations	22498	22466	22408	22561	22525	22533
R-squared	0.13	0.08	0.08	0.10	0.06	0.09

OMT Program and Credit Access

- Compare period 1st October 2011 – 31st March 2012 (wave 6) to the period 1st October 2012 – 31st March 2013 (wave 8).
- Key results (all firms)
  - Credit access for SMEs in stressed countries increased about 2% but not statistically significant (regardless of rationing channel)
- Germany may be a special case
  - Experienced largest secular decline in credit constraints
  - and a huge decrease in discouraged borrowers after announcement (22% to 14% in one year)
- Results excluding Germany in control group
  - Now significant OMT effect – 6.4% less likely to be constrained
  - Mostly less likely to be quantity rationed and discouraged

OMT Program and Credit Access

Panel A. All firms

	Credit constrained	Loan application denied	Rationed	Refused due to high cost	Discouraged from applying
	(1)	(2)	(3)	(4)	(5)
Stressed × Post_OMT	-0.0170	0.0033	-0.0098	-0.0019	-0.0217
	(0.0435)	(0.0147)	(0.0308)	(0.0046)	(0.0222)
Firm-specific controls	Yes	Yes	Yes	Yes	Yes
Country × Industry FEs	Yes	Yes	Yes	Yes	Yes
Time FEs	Yes	Yes	Yes	Yes	Yes
No. Observations	5136	4215	4231	3955	5142
R-squared	0.15	0.13	0.10	0.11	0.15

Panel B. Excluding firms in Germany

	Credit constrained	Loan application denied	Rationed	Refused due to high cost	Discouraged from applying
	(1)	(2)	(3)	(4)	(5)
Stressed × Post_OMT	-0.0635**	-0.0045	-0.0483**	-0.0030	-0.0466**
	(0.0279)	(0.0188)	(0.0220)	(0.0058)	(0.0235)
Firm-specific controls	Yes	Yes	Yes	Yes	Yes
Country × Industry FEs	Yes	Yes	Yes	Yes	Yes
Time FEs	Yes	Yes	Yes	Yes	Yes
No. Observations	4610	3724	3740	3580	4616
R-squared	0.10	0.09	0.06	0.11	0.13

Firm Heterogeneity and the OMT

- **Evidence that small firms may be more sensitive to monetary policy shocks (e.g., Gertler and Gilchrist 1994, Jimenez et al. 2012)**
- **Results of OMT on SMEs in stressed countries**
  - **Firms with better outlook and better credit history less constrained**
  - **Firms with better capital, however, more constrained**

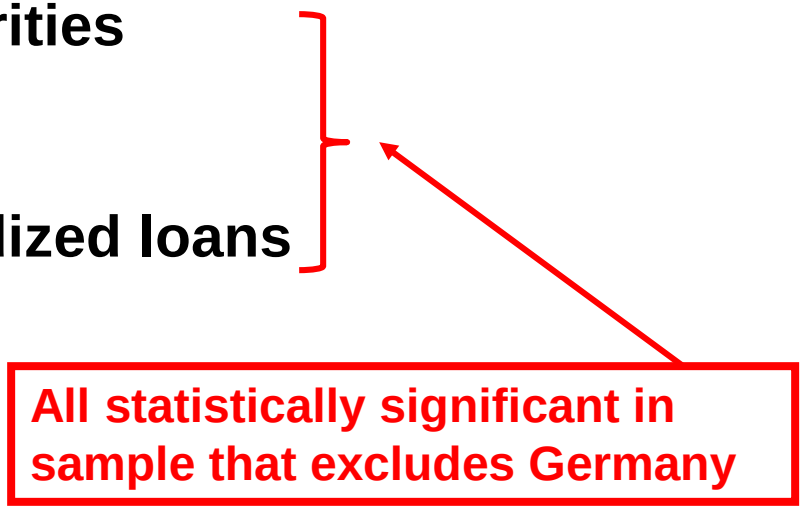
Firm Heterogeneity and the OMT

Panel B. Excluding firms in Germany

	Credit constrained	Loan application denied	Rationed	Refused due to high cost	Discouraged from applying
	(1)	(2)	(3)	(4)	(5)
Stressed × Post_OMT × Size_4	0.1616***	0.2244**	0.0823	0.9982***	-0.1025
	(0.0508)	(0.1294)	(0.0819)	(0.0004)	(0.0588)
Stressed × Post_OMT × Outlook better	-0.2517***	-0.0307*	-0.1117***	-0.0066***	-0.1037***
	(0.0391)	(0.0134)	(0.0107)	(0.0013)	(0.0254)
Stressed × Post_OMT × Capital better	0.2219***	0.1496***	0.1675***	-0.0054	0.0276
	(0.0600)	(0.0478)	(0.0562)	(0.0042)	(0.0472)
Stressed × Post_OMT × Credit history better	-0.1899**	0.0241	-0.0915***	-0.0059	0.0342
	(0.0651)	(0.0369)	(0.0165)	(0.0026)	(0.0911)
Firm-level controls	Yes	Yes	Yes	Yes	Yes
Double interactions	Yes	Yes	Yes	Yes	Yes
Country × Industry FEs	Yes	Yes	Yes	Yes	Yes
Time × Industry FEs	Yes	Yes	Yes	Yes	Yes
No. Observations	4610	3724	3740	3580	4616
R-squared	0.10	0.10	0.10	0.15	0.14

Firm Financing and the OMT

- **Results are a mirror image of crisis results in Table 8 – after OMT firms in stressed countries**
  - **Less likely to issue debt securities**
  - **More likely to use equity**
  - **Less likely to use trade credit**
  - **Less likely to use gov't subsidized loans**



Conclusion

- **Examined dual effect of:**
  - **Sovereign stress**
  - **Non-conventional monetary policy: OMT**
- **Our contribution**
  - **One of few to examine cross-country crunch effects (others focused central and eastern Europe)**
  - **First to examine differential effect of sovereign debt-stressed vs. non-stressed countries on SME finance**
  - **First to examine effect of OMT**
- **Findings**
  - **Confirmed - in broadest study yet – significant credit crunch**
  - **Sovereign debt effect significant**
  - **OMT effect positive**
  - **Trade credit important alternative in stressed countries**