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

Annalisa Ferrando, Alexander Popov
and Gregory F. Udell

Presented at

RIETI-MoFiR-Hitotsubashi-JFC International Workshop
on Banking and Financial Research
June 15, 2015
Research Institute of Economy, Trade and Industry

KELLEY SCHOOL OF BUSINESS
INDIANA UNIVERSITY

Presentation Overview

- Motivation
- Context
- Data
- Empirical strategy
- Results
- Conclusion

Motivation

1. Examine the impact of the sovereign debt crisis on SME access to finance
2. Examine the impact of unconventional monetary policy on SME access to finance, specifically the Outright Monetary Transactions (OMT) Program (announced August 12, 2012)
3. Examine credit crunch in a Euro-zone wide context
4. Studying changes in firm financing patterns

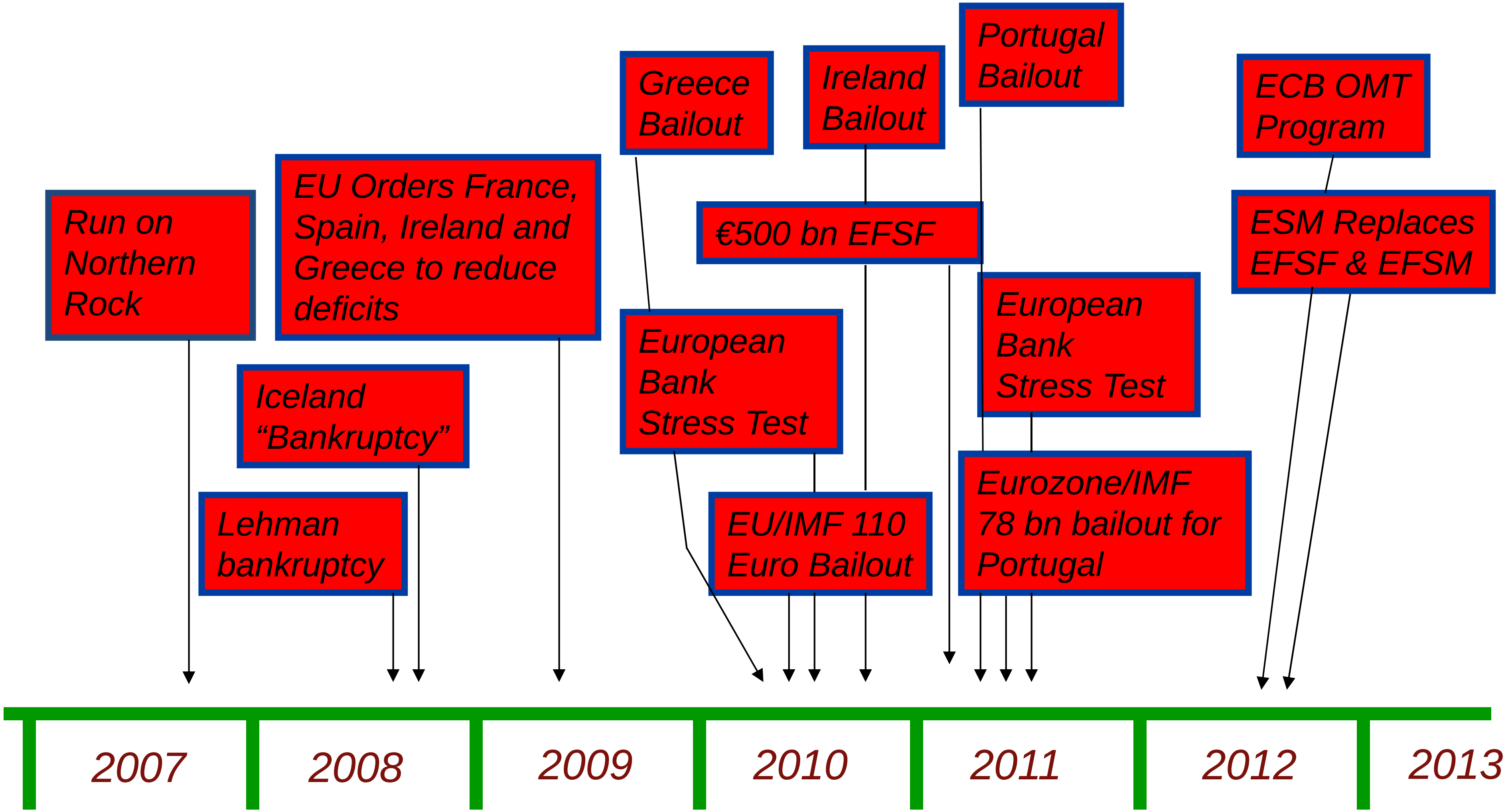
Sovereign Debt and the OMT Program

- **Five euro area countries (Greece, Ireland, Italy, Portugal, and Spain) suffered significant deterioration in their creditworthiness**
  - **Banks hold significant amounts of domestic sovereign debt**
  - **This shock to bank balance sheets could significantly affect SME access to finance**
- **In terms of scale, the most important unconventional monetary policy employed in the Euro area since its inception.**
  - **Under the OMT the ECB committed to purchasing in secondary markets and under a number of strict conditions unlimited amounts of government debt issued by eligible euro area governments.**

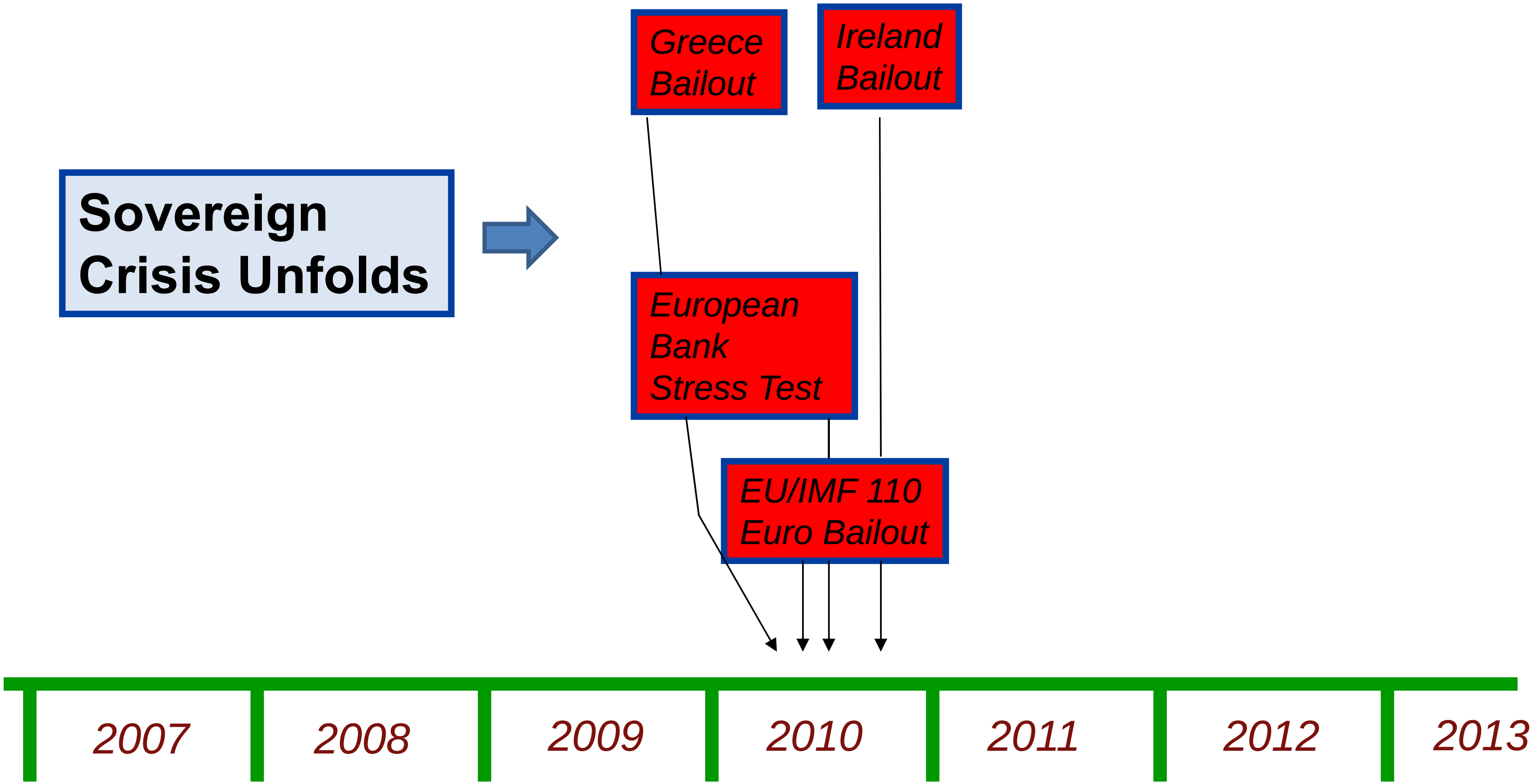
Context – The European Environment

- **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**

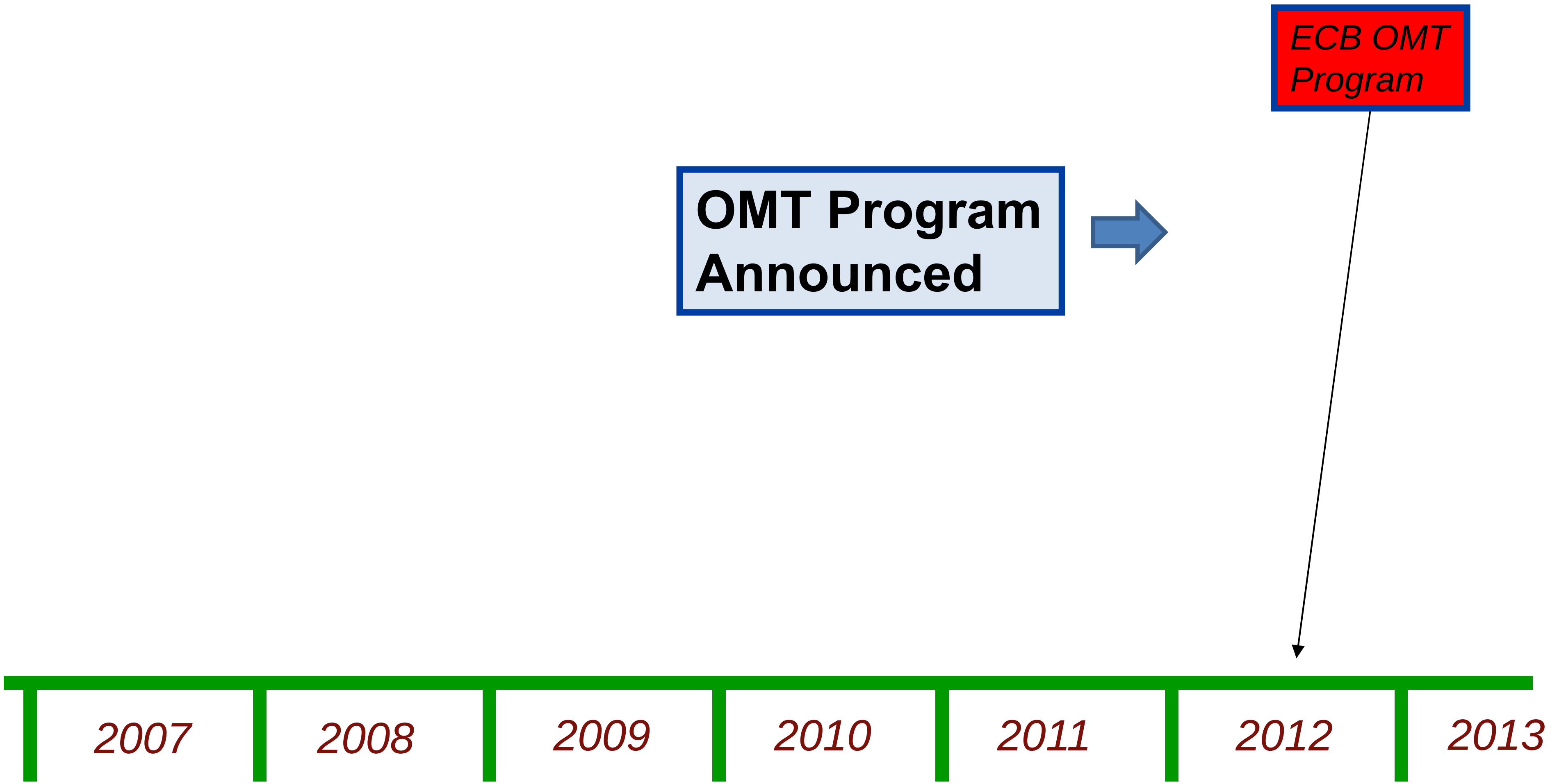
EUROPE CRISIS TIMELINE



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?

Our Focus

SME Finance - Academic Research

- **Bank funding shocks and firm financing**
  - **Single-country setting such as Spain (e.g., Jimenez et al. 2012) and Italy (e.g., Presbiterro, Udell and Zazzaro 2014)**
  - **Multi-country setting (e.g., Popov and Udell 2012; Beck et al. 2014)**
  - **Key issue: Identification of supply effects**
    - **- No natural experiment ala Peek and Rosengren (1997)**

- **Monetary policy, the real economy, and asset prices**
  - **SMEs more sensitive to monetary policy (e.g., Gertler and Gilchrist 1994)**
  - **OMT => reduction in sovereign bond yields => increased real activity (Giannone et al. 2012)**
  - **U.S. QE1 and QE2 on borrowing costs (Krishnamurty and Vissing-Jorgensen, BPEA 2011)**
  - **ECBs Security Markets Program affect on bond yields (Eser and Schwaab 2013, Ghysels et al. 2014)**

Our Paper and the Research Frontier

- **Research frontier**
  - **Identifying channels through which sovereign stress affects the economy at large including effects on SME lending**
  - **Effects of non-conventional monetary policy and bank lending particularly to SMEs – and specifically the OMT**

    and
  - **Studying changes in firm financing patterns**
  - **Identifying Euro-wide effects on SME access to finance**
- **We use exogenous variation in funding conditions across stressed and non-stressed countries (diff-in-diff) to study changes in SME credit access between 2009 and 2013**
  - **45,000 firms in 11 euro area countries (ECB's SAFE survey data)**
  - **Pre/post sovereign debt crisis, pre/post OMT announcement**

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 *OMT announcement***
- **<u>Pre-crisis</u>: Jan 1, 2009 – Dec 31, 2009 (waves 1 and 2)**
- **<u>Sovereign debt crisis unfolds</u>: April 1, 2010 – Sept 30, 2010 (wave 3)**
- **<u>Post-crisis/Pre-OMT</u>: Oct 1, 2010 – March 31, 2012 (waves 4, 5, 6)**
- **<u>OMT announcement</u>: April 1, 2012 – Sept 30, 2013 (wave 7)**
- **<u>Post-OMT</u>: 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: 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

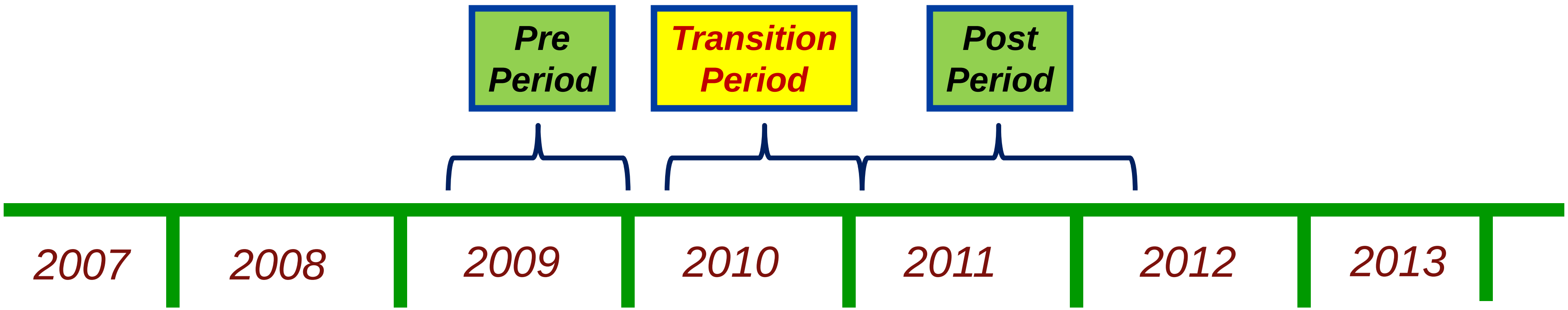
Transition Periods

The SAFE Data (cont.)

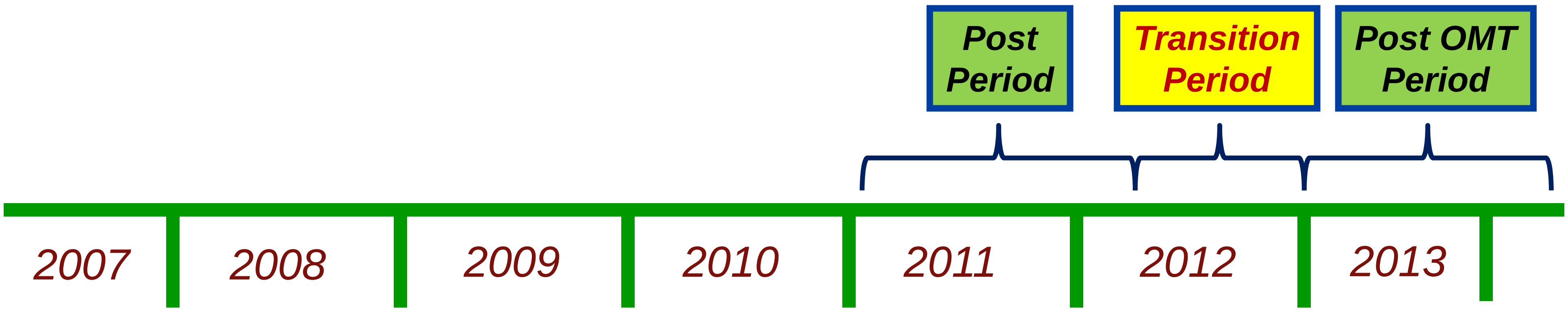
- ***Sovereign debt crisis*** **and** ***OMT announcement***
- **Pre-crisis: Jan 1, 2009 – Dec 31, 2009 (waves 1 and 2)**
- Sovereign debt crisis unfolds: April 1, 2010 – Sept 30, 2010 (wave 3)
- **Post-crisis/Pre-OMT: Oct 1, 2010 – March 31, 2012 (waves 4, 5, 6)**
- OMT announcement: April 1, 2012 – 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

Test Periods

TIMELINE – SOVEREIGN DEBT TESTS



TIMELINE – OMT TESTS



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
  - Rejected, discouraged, use of retained earnings / equity / debt securities / trade credit / subsidies / other loans

The SAFE Data (cont.)

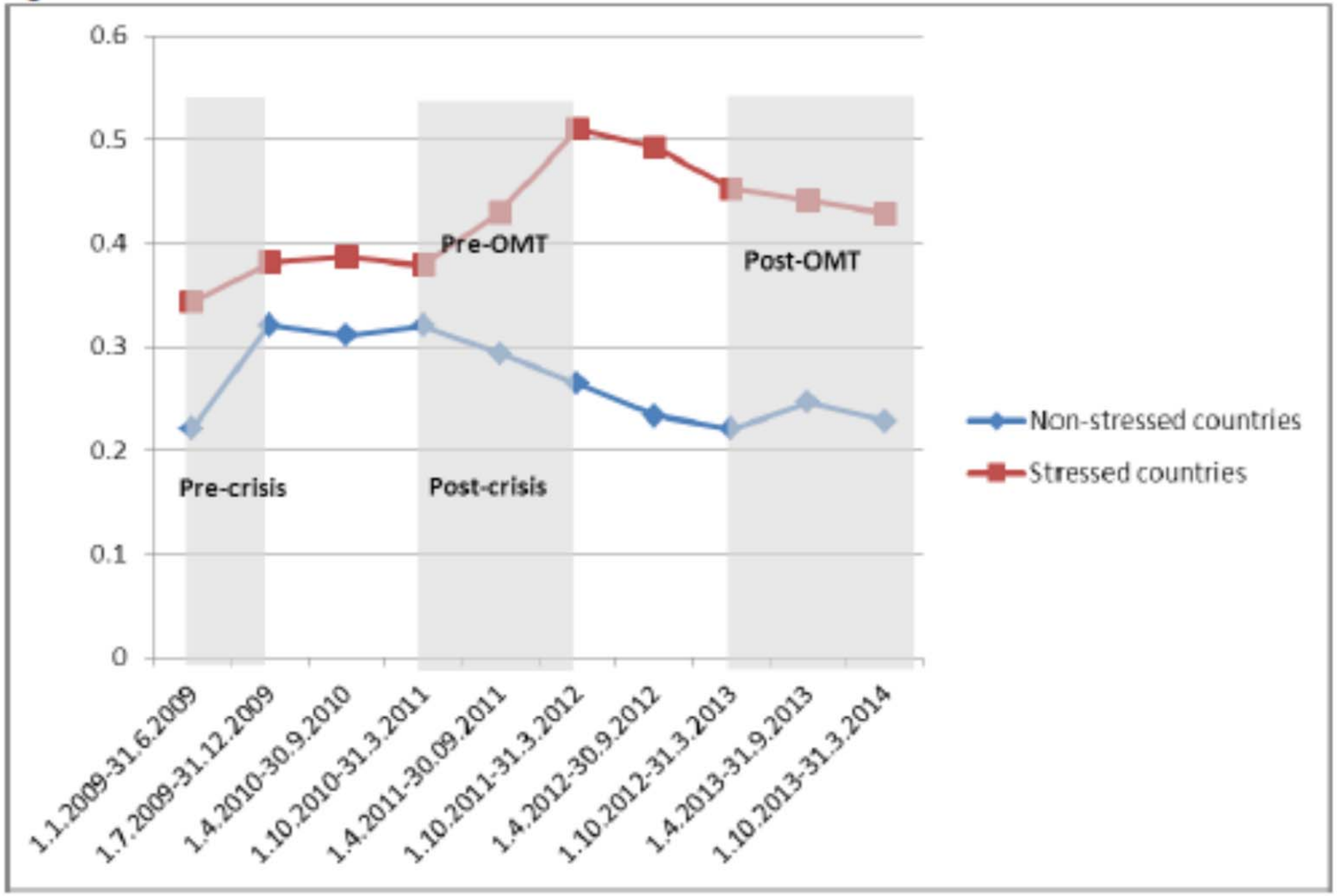
- ***Sovereign debt crisis*** **and** ***OMT announcement***
- Pre-crisis: Jan 1, 2009 – Dec 31, 2009 (waves 1 and 2)
- Sovereign debt crisis unfolds: April 1, 2010 – Sept 30, 2010 (wave 3)
- Post-crisis/Pre-OMT: Oct 1, 2010 – March 31, 2012 (waves 4, 5, 6)
- OMT announcement: April 1, 2012 – Sept 30,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

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

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.

Empirical Strategy

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

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

- $Credit\ constrained_{isct} = 1$ 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
- $Post_t = 1$ after sovereign debt crisis ($Post\_OMT_t$)
- $Stressed\ _{isc} = 1$ if firm in Greece, Ireland, Italy, Portugal, or Spain
- X_{isct} is a vector of time varying firm-specific controls (size, age, turnover, demand, etc.)
- ϕ_{sc} is a vector of country-sector fixed effects (i.e., 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

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

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

Sovereign Tests

- $Credit\ constrained_{isct} = 1$ if firm *i* in sector *s* in country *c* at time *t:*
  - applied for a bank loan or credit line 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 ($Post\_OMT_t$)
- $Stressed_{isc} = 1$ if firm in Greece, Ireland, Italy, Portugal, or Spain
- X_{isct} is a vector of time varying firm-specific controls (size, age, turnover, demand, etc.)
- ϕ_{sc} is a vector of country-sector fixed effects (i.e., 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

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

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

OMT Tests

- $Credit\ constrained_{isct} = 1$ 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 ($Post\_OMT_t$)
- $Stressed_{isc} = 1$ if firm in Greece, Ireland, Italy, Portugal, or Spain
- X_{isct} is a vector of time varying firm-specific controls (size, age, turnover, demand, etc.)
- ϕ_{sc} is a vector of country-sector fixed effects (i.e., 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 I

- ***Sovereign debt*** **crisis tests:**
  - **Strong supply-drive reduction in SME access to credit associated with sovereign debt crisis**
  - **Higher probability of rationing in stressed countries**
  - **Little evidence of a flight-to-quality effect**
  - **Rationing in both *prices* and *quantity***
  - **Firms tended to resort to more trade credit – but, this was not statistically significant**

Key Results II

- ***OMT program tests***
  - **Main tests:**
    - **Credit access improved in stressed countries by about 2% - but not statistically significant**
    - **Neither price rationing or quantity rationing evident**

    However, tests affected by the fact that Germany is a special case: the country with largest secular decline in credit constraints during this period
  - **Tests without Germany:**
    - **Now find a significant OMT effect reduced credit constraints in stressed countries (mostly relaxed quantity rationing and fewer discouraged borrowers)**
    - **Also find a drop in the use of trade credit in stressed countries**

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 if Germany not included in the benchmark**
  - **Some evidence of trade credit as an important alternative in stressed countries**