Credit Prices vs Credit Quantities in the EMU: Which Tell a Better Story?

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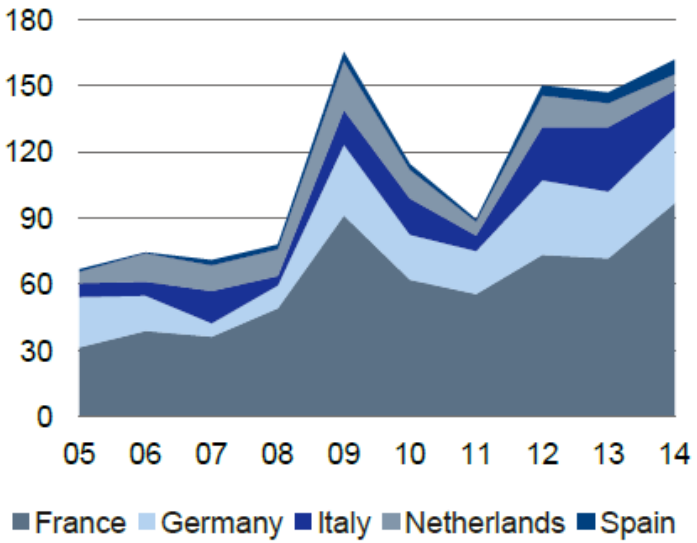
A Few Facts about the Changing Financial Landscape in the Euro Area

- Need to move beyond bank-intermediated finance
- The bond market is becoming more important

Gross corporate bond issuance volumes in euro area 17

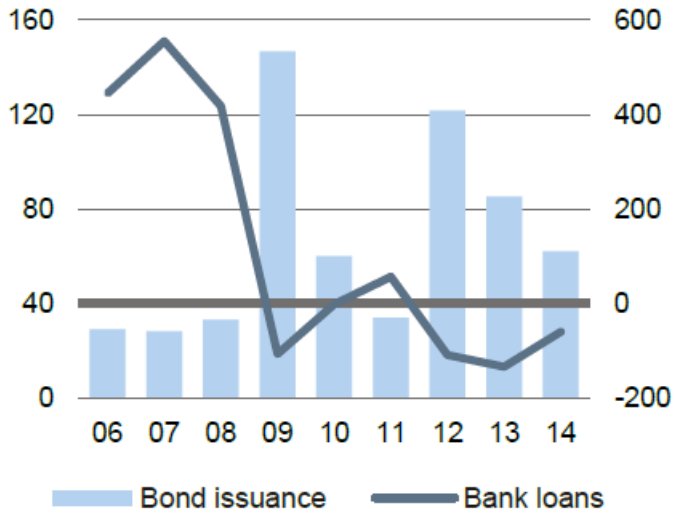
EUR bn



Sources: ECB, Deutsche Bank Research

Gradual shift from loans to bonds in euro area 18

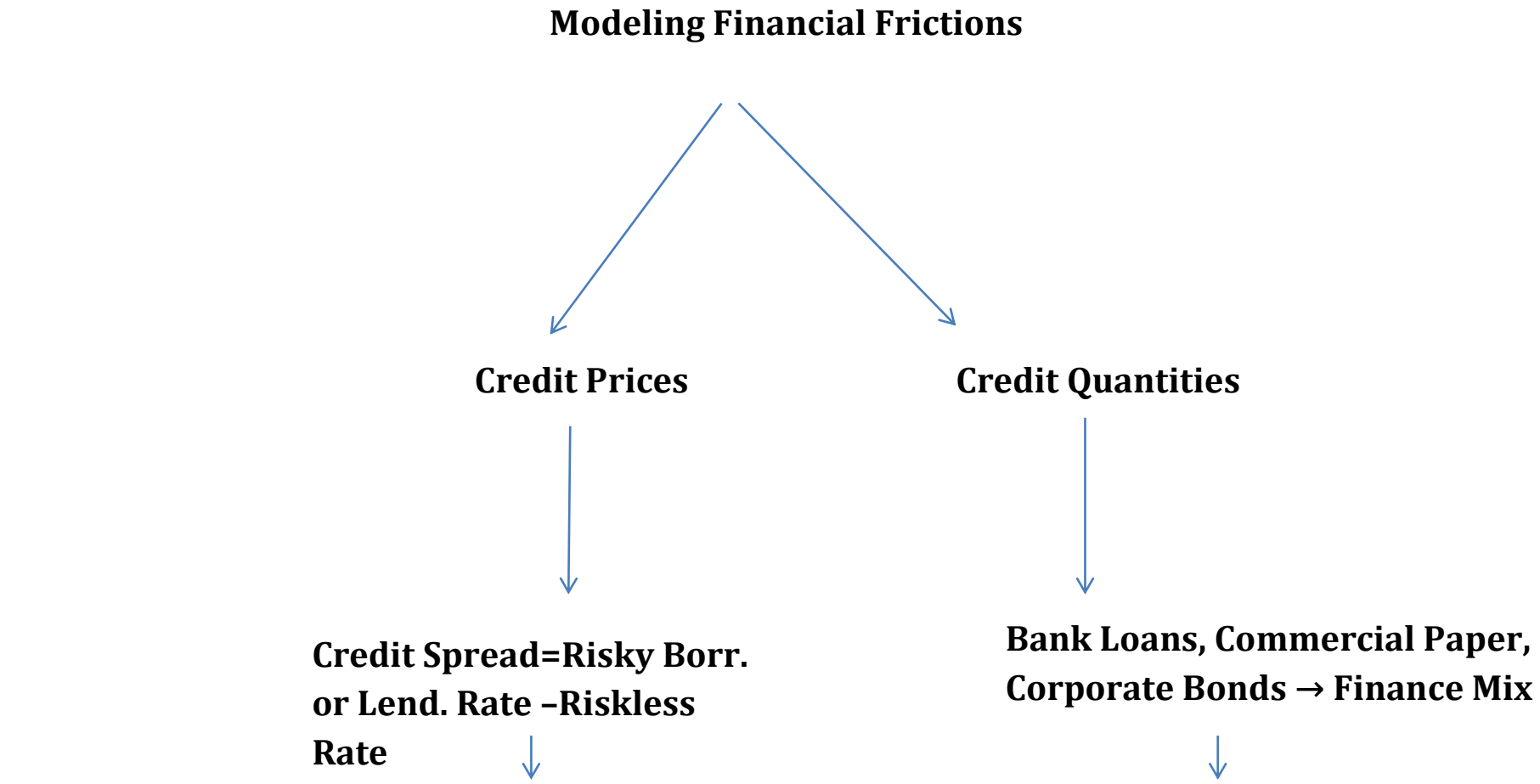
EUR bn, Net bond issuance (left),
EUR bn, Bank loan flows (right)



Sources: ECB, Deutsche Bank Research

- What are the implications of changes in external finance on economic activity?

Literature on Credit Frictions



Q: How Are These Frictions Propagated to the Real Sector?

A Snapshot of the Early Literature:

- One strand of the literature focuses on c**redit quantities and changes in monetary policy as the instigator of change.**

  - Bernanke and Blinder (AER, 1988): loans and bonds are imperfect substitutes for banks.

    bank lending channel of monetary policy augments standard interest rate channel.

  - Kashyap, Stein, and Wilcox (AER, 1993)
    - stress importance of **commercial paper** as an alternative source of credit.
    - attempt to solve identification problem by designing a finance mix variable: $\frac{BL}{BL+CP}$
    - tightening of monetary policy reduces bank lending but spurs issuance of commercial paper.
    - $\frac{BL}{BL+CP}$ decreases and should lead to a decrease in economic activity.

- Another strand of the literature focuses on what happens to the **price of credit** in the wake of a change in monetary policy: **balance sheet channel.**

- Bernanke and Gertler (1989), Bernanke, Gertler, and Gilchrist (1999): external finance premium rises in the wake of monetary policy change, amplifying the initial monetary policy effect.
- This view places a financing constraint on firms and households.
- Composition and mode of operation of financial sector is ignored.

Current Literature:

More recent models take a somewhat different approach. They try to show what changes an **economic crisis** wreaks on the behavior of financial institutions and markets: Adrian, Colla, and Shin (2013).

- Attention is paid to reaction of **suppliers** of credit to changes in economic fundamentals.
- Credit is sourced from banks – loans – or from the open market – bonds.
- **Demand for** credit is of secondary importance.
- Paper demonstrates the importance of the **risk premium** as an indicator of stress in financial markets and shows how banks and bond issuers respond to changes in the risk premium.

- Gilchrist and Zakrajsek (2012) underscore importance of **excess bond premium as** a predictor of aggregate economic activity.
- Excess bond premium at firm level = (Risky bond rate – rate on riskless synthetic bond) adjusted for firm characteristics.

Building Blocks of the Adrian, Colla and Shin Model (*NBER Macroeconomics Annual (2013))*

- There are two sources of credit:
  Banks supply **intermediated credit** while households supply **direct credit**.
- Banks are risk-neutral while households are risk-averse.

Banks

The ratio of notional liabilities to notional assets for a 'successful' bank is given by

$$\frac{(1+f)L}{(1+r)C_B} = \psi(\boldsymbol{\varepsilon}, \alpha, \rho) \quad (1)$$

where $0 < \psi(\boldsymbol{\varepsilon}, \alpha, \rho) \leq 1$

r = lending rate

f = interest rate on deposits (riskless rate)

L = liabilities (mainly deposits)

C_B = bank credit (loans)

$\boldsymbol{\varepsilon}$ = project risk (probability that project fails ⟶ default)

α = value at risk (probability that the bank fails)

ρ = weight on aggregate factor in determining project's pay-off.

Combining (1) with the balance sheet constraint $C_B = L + E$ yields the supply of bank credit:

$$C_B = \frac{E}{1 - \frac{1+r}{1+f}\psi} \qquad (2)$$

From now on assume $f = 0$.

Households

- Have mean-variance preferences
- The total supply of household credit (demand for bonds) is given by

$$C_H = \frac{T((1-\varepsilon)(1+r)-1)}{\sigma^2(1+r)^2} \qquad (3)$$

Where T = a measure of risk tolerance

$\sigma^2 =$ variance of the realized value of bonds which depends on $\boldsymbol{\varepsilon}$ and ρ.

- Risk premium $\pi = (1-\varepsilon)(1+r)-1$ (4)

Sources of Credit: $C_B + C_H$

Demand for Credit: $K(\pi)$ with $K'(\pi) < 0$

Market Clearing Condition:

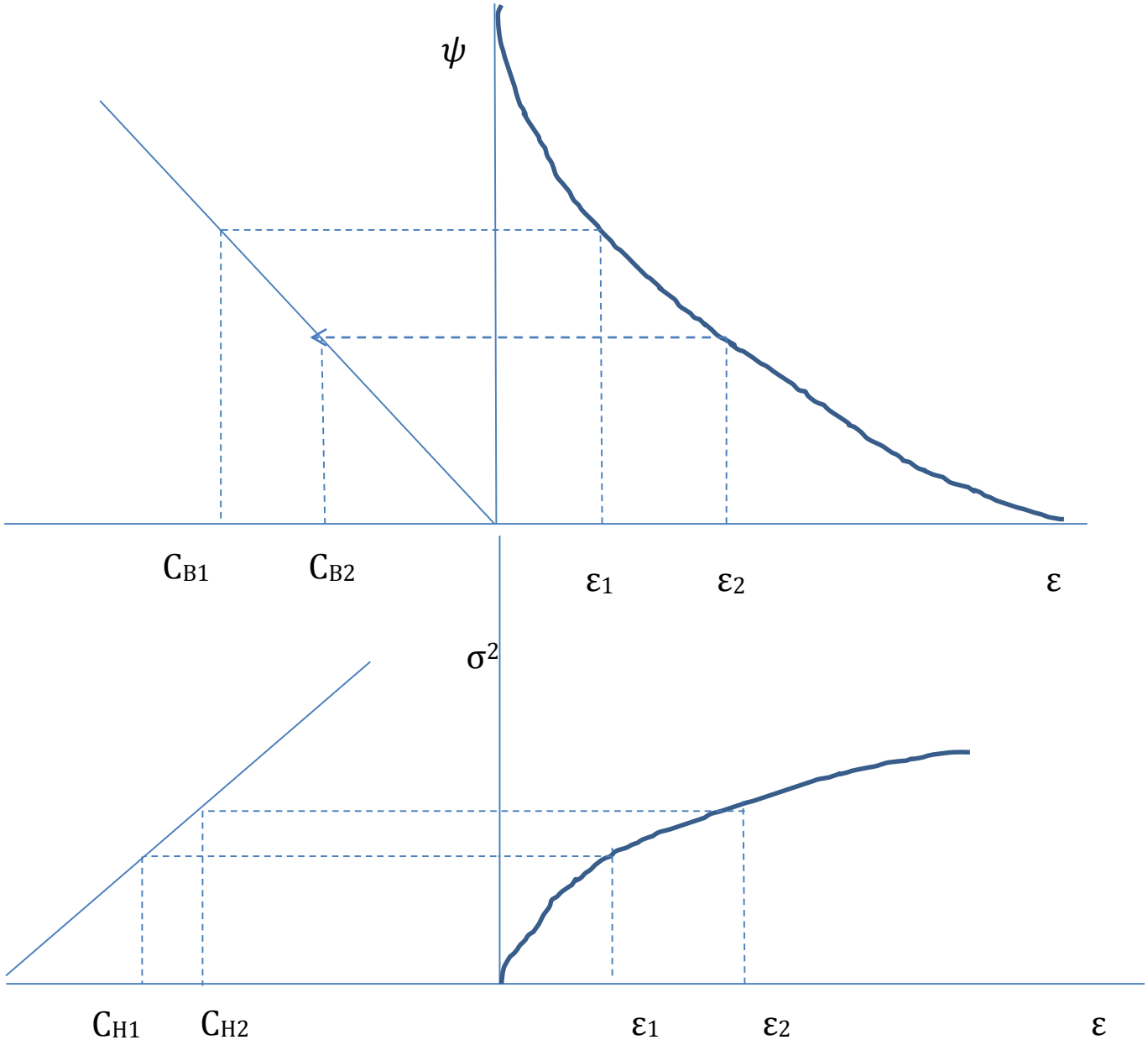
$$C_B + C_H = K(\pi)$$

$$\frac{E}{1 - \frac{1+\pi}{1-\epsilon}\psi} + \frac{T(1-\epsilon)^2\pi}{\sigma^2(1+\pi)^2} = K(\pi) \qquad (5)$$

Q1: How does the risk premium π react to increases in the probability of project default (worsening economic fundamentals) $\boldsymbol{\varepsilon}$**?**

Q2: What are the implications for the size of the banking sector and the size of the bond market?

Understanding the Importance of ε in the Model



- An increase in project risk $\boldsymbol{\varepsilon}$ **decreases** the supply of both bank and direct credit. Total credit availability $C_B + C_H$ falls. This result will prove helpful in evaluating the response of π to changes in $\boldsymbol{\varepsilon}$**, ie.** $\boldsymbol{\frac{d\pi}{d\varepsilon}}$**.**
- How is this response determined?

  Define $G(\pi, \varepsilon) = C_B + C_H - K(\pi) = 0$

  Then $\frac{\partial G}{\partial \pi}\frac{d\pi}{d\varepsilon} + \frac{\partial G}{\partial \varepsilon} = 0$

$$\frac{d\pi}{d\varepsilon} = -\frac{\frac{\partial G}{\partial \varepsilon}}{\frac{\partial G}{\partial \pi}} \qquad (6a)$$

$\frac{\partial G}{\partial \epsilon} = \frac{\partial C_B}{\partial \varepsilon} + \frac{\partial C_H}{\partial \varepsilon}$ $\qquad$ $\frac{\partial G}{\partial \pi} = \frac{\partial C_B}{\partial \pi} + \frac{\partial C_H}{\partial \pi} - \frac{\partial K}{\partial \pi}$

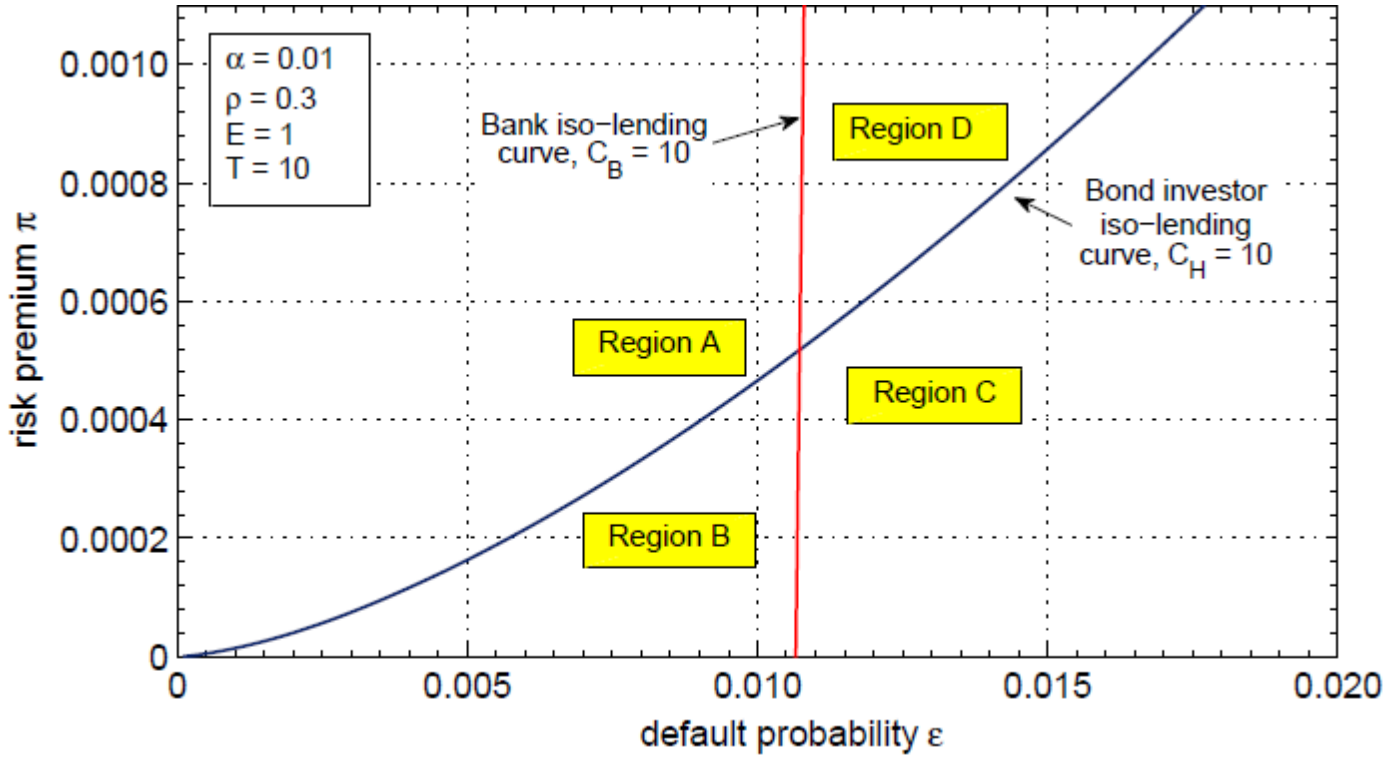
$$\frac{d\pi}{d\varepsilon} = -\frac{\frac{\partial C_B}{\partial \varepsilon} + \frac{\partial C_H}{\partial \varepsilon}}{\frac{\partial C_B}{\partial \pi} + \frac{\partial C_H}{\partial \pi} - \frac{\partial K}{\partial \pi}} > 0 \qquad (6b)$$

as partial derivatives in the numerator are negative but positive in the denominator.

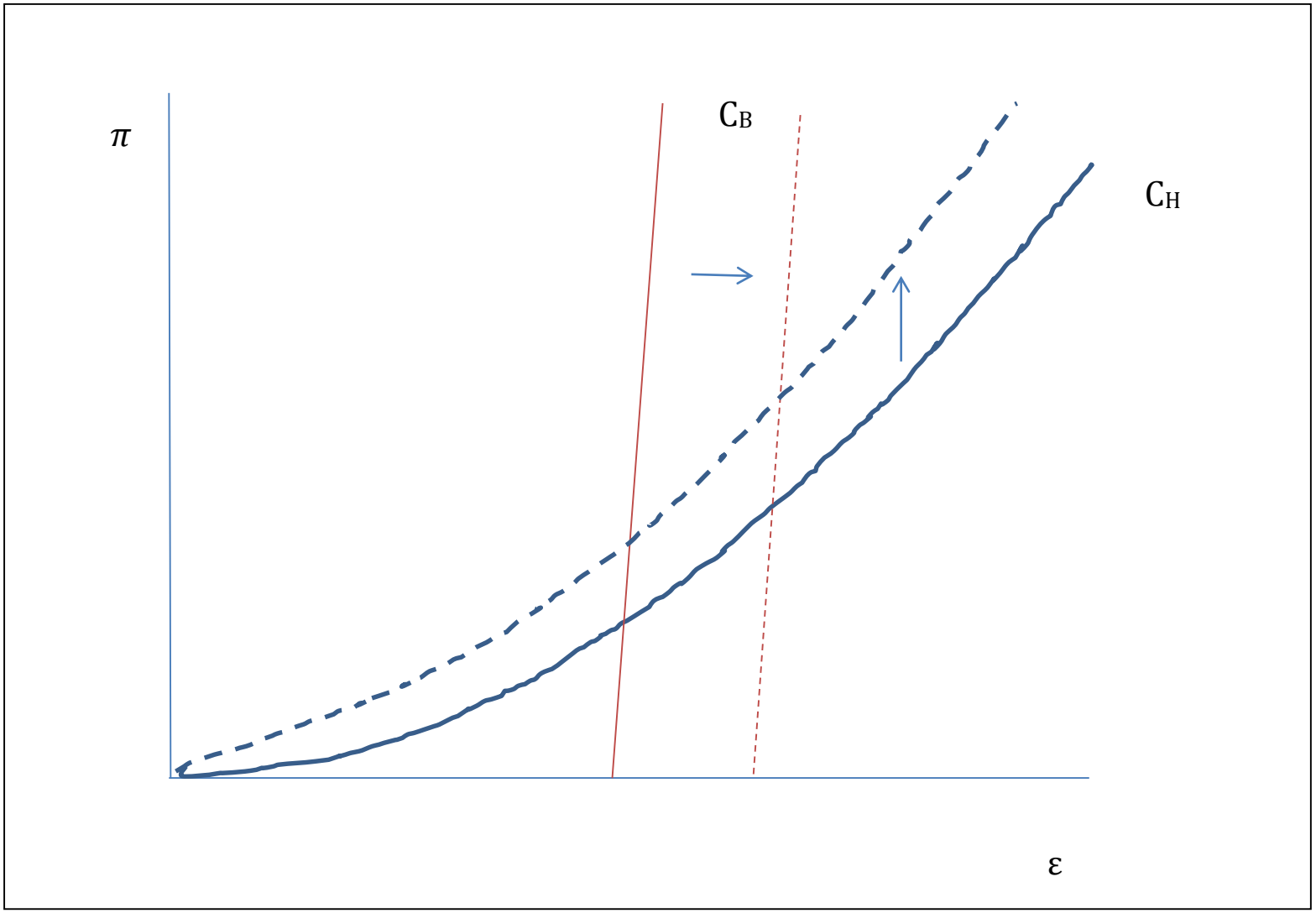
Note: For this result to hold unambiguously $\boldsymbol{\varepsilon}$ **must be small and** $\boldsymbol{\pi < 1}$**,** $\boldsymbol{i.e.}$ **the risk premium is small.**

Answer to Q1: The risk premium increases as project risk increases. Thus the 'required' return rises and credit becomes more expensive relative to the riskless rate.

To provide an answer to Q2, ACS construct so-called iso-lending curves for banks and bond investors. An iso-lending curve shows the relationship between $\boldsymbol{\varepsilon}$ and π for a fixed amount of credit provided by a credit supplier.



- The iso-lending curve is steeper for banks than for bond investors. That's because banks are risk neutral while households are risk-averse.
- Initially both banks and bond investors supply 10 units of credit and the credit market is in equilibrium.
- Then market fundamentals deteriorate, driving up $\boldsymbol{\varepsilon}$.



Sequence of events:

- ***ε* increases,** bank lending contracts, leading to a rightward shift of the iso-lending curve, causing an increase in **π.**
- For the credit market to clear, the bond market must make up the shortfall of credit supply relative to demand (which shrinks as **π** rises).
- The rise in **π induces bond holders to close** the existing gap between demand and supply by providing more bond financing. A new equilibrium is reached where the overall supply of credit has fallen.

Answer to Q2: In the wake of an increase in default risk, the absolute size of the banking sector shrinks while the bond market expands. The relative size of the banking sector shrinks.

Macroeconomic Implications

- Increase in risk premium raises borrowing costs: the spread between the cost of borrowing and the riskless interest rate increases.
- Potentially, the existence of the financial friction is more evident in the movements of spreads rather than the changes in credit quantities.
- If so, movements in credit spreads should provide a more reliable signal about future economic activity than credit quantities ⟶ testable hypothesis.

The Empirical Analysis

Scope: 10 member countries of the Euro zone
(Austria, Belgium, Finland, France, Germany, Greece, Italy, Netherlands, Portugal, and Spain)

Sample Period: 2003-2016 (March)
Data Frequency: Monthly

Measures of Economic Activity: Industrial Production, Unemployment Rate, Retail Sales (Index of Deflated Turnover), Turnover of Capital Goods.

Measures of Credit: Bank Loans to Euro-Area Non-Financial Corporations reported by MFI Institutions Excluding ESCB, Volume of Securities Issued by Non-Financial Corporations (Securities Other Than Shares; All Currencies Combined)
Credit Spreads:

Spread = Cost of Borrowing for Non-Financial Corporations – 3 mo Money Market Rate

ECB-Spread = COBNFC(across maturity spectrum) – Swap Rate

Official Definition: *Lending spread; weighted spread between the (MIR) rate for **NEW** NFC loans and the swap rate with maturity corresponding to the loan category initial period of rate fixation.(?)*

Aggregate Evidence of the Behavior of Credit Measures and Credit Spreads

- **Shaded areas** mark European-wide recessions: 2008q2-2009q2 2011q4-2013q1

- Summary measures and a few simple graphs…..

  Credit Quantities

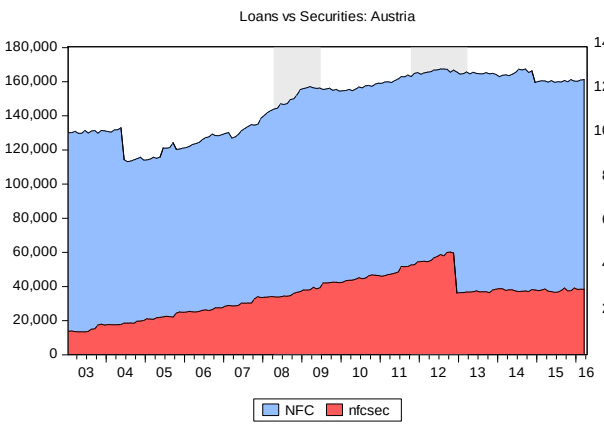
  - Volume of real credit outstanding
  - Change in real loans and securities
  - **Finance mix**

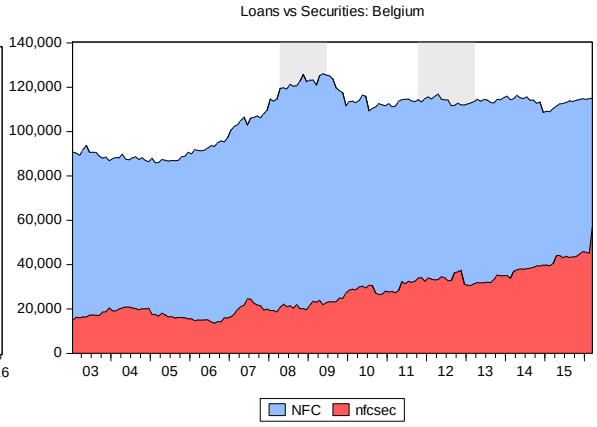
  Interest Rates and Spreads

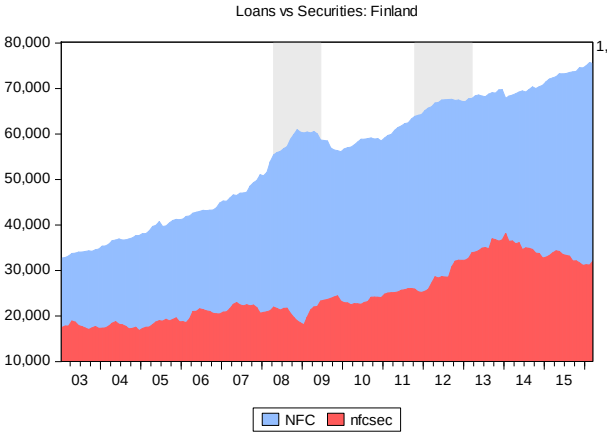
  - **Spread**
  - ECB-spread
  - GZ-spread

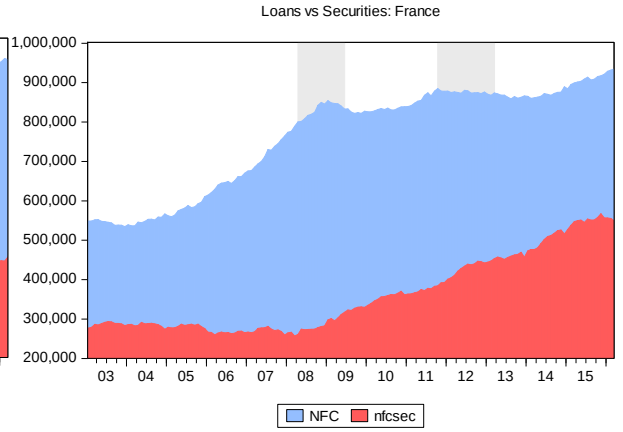
The Relative Importance of Bank Loans vs Securities: 2003-2016

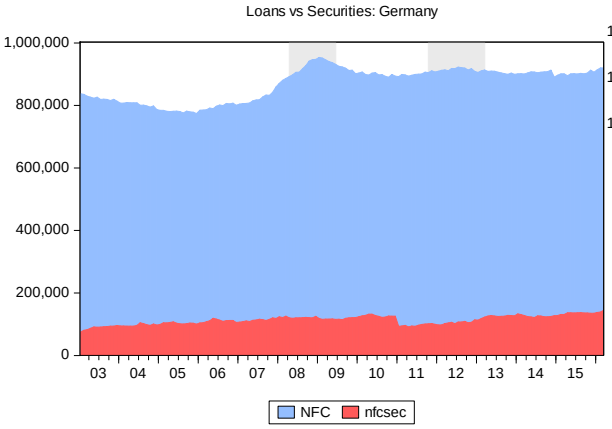
NFC = Bank Loans to Non-Financial Corporations NFCSEC = Securities Issued by Non-Financial Corporations (millions of Euro)

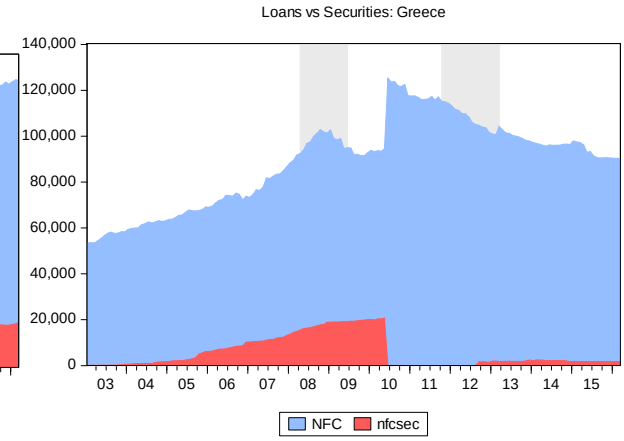


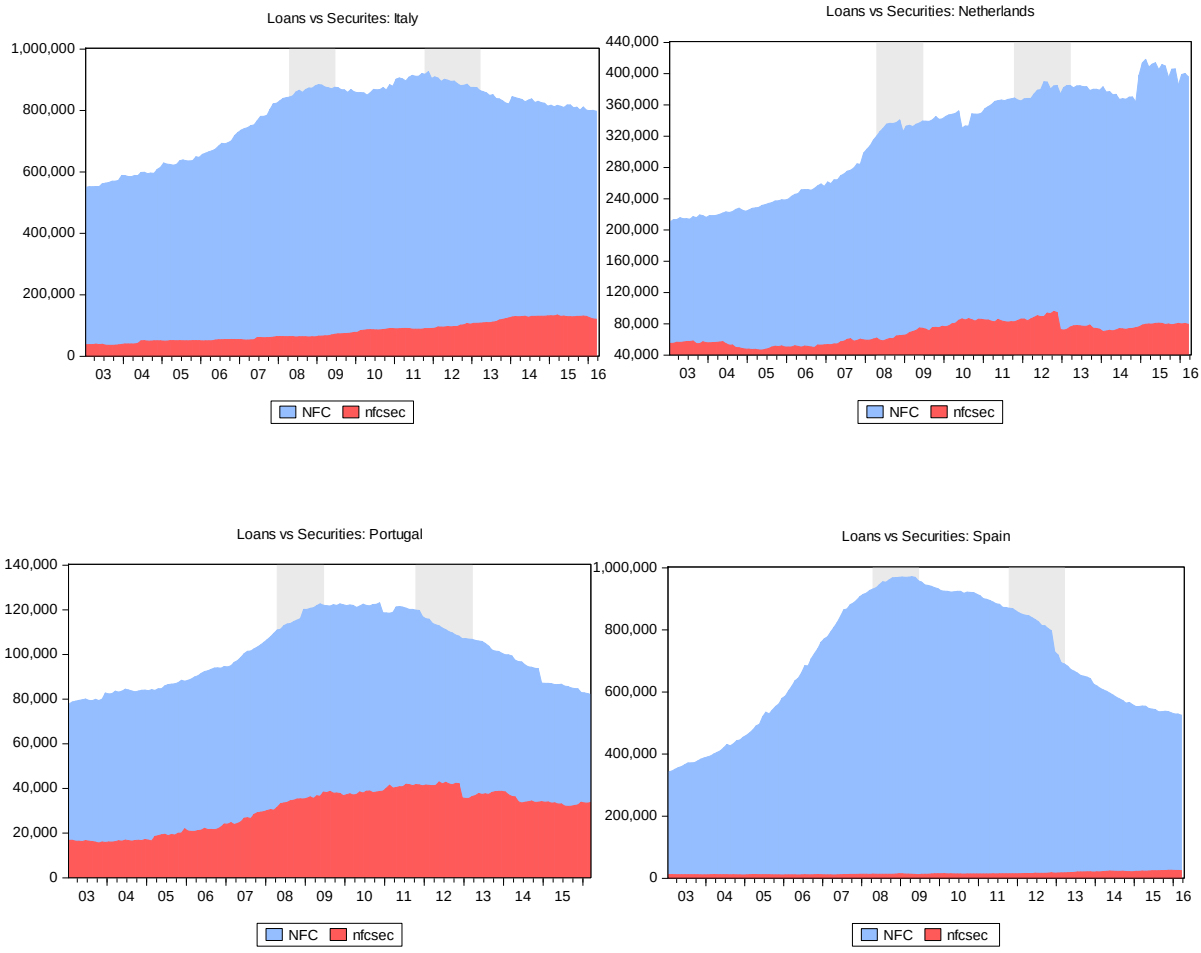












Note: Shaded areas are recessions in Europe as determined by CEPR.

Summary Statistics of Credit Quantities over the 2003m1-2016m3 Sample Period

	Real Credit						Credit to GDP Ratio	
Country	**Beginning**[1] (mill. of €)	**End**[1] (mill. of €)	**Min** (mill. of €)	**Max** (mill. of €)	**Mean of Growth Rate (%)**[4]	**Std. Dev. of Growth Rate (%)**[4]	**Beginning**[2]	**End**[2]
Austria	182409	198618	163529	237683	0.77	18.94	0.635964	0.58622
Belgium	135857	162698	122975	170608	2.05	23.68	0.387122	0.399294
Finland	62852	106782	62209	107364	4.21	11.86	0.345046	0.509748
France	1009073	1488875	970320	1499818	2.96	9.5	0.522101	0.680074
Germany	1104442	1057124	1003837	1170291	-0.28	9.94	0.413671	0.348479
Greece[3]	68724	93049	67660	129872	2.52	21.86	0.329573	0.524052
Italy	739792	923608	731125	1056233	1.78	10.05	0.438377	0.564671
Netherlds	324398	478936	320944	504493	3.05	18.65	0.543838	0.70236
Portugal	117827	116981	115140	174689	-0.05	13.64	0.668681	0.647859
Spain	465588	562645	461477	1079601	1.55	19.08	0.481525	0.512641

[1] Average of first (last) four observations.

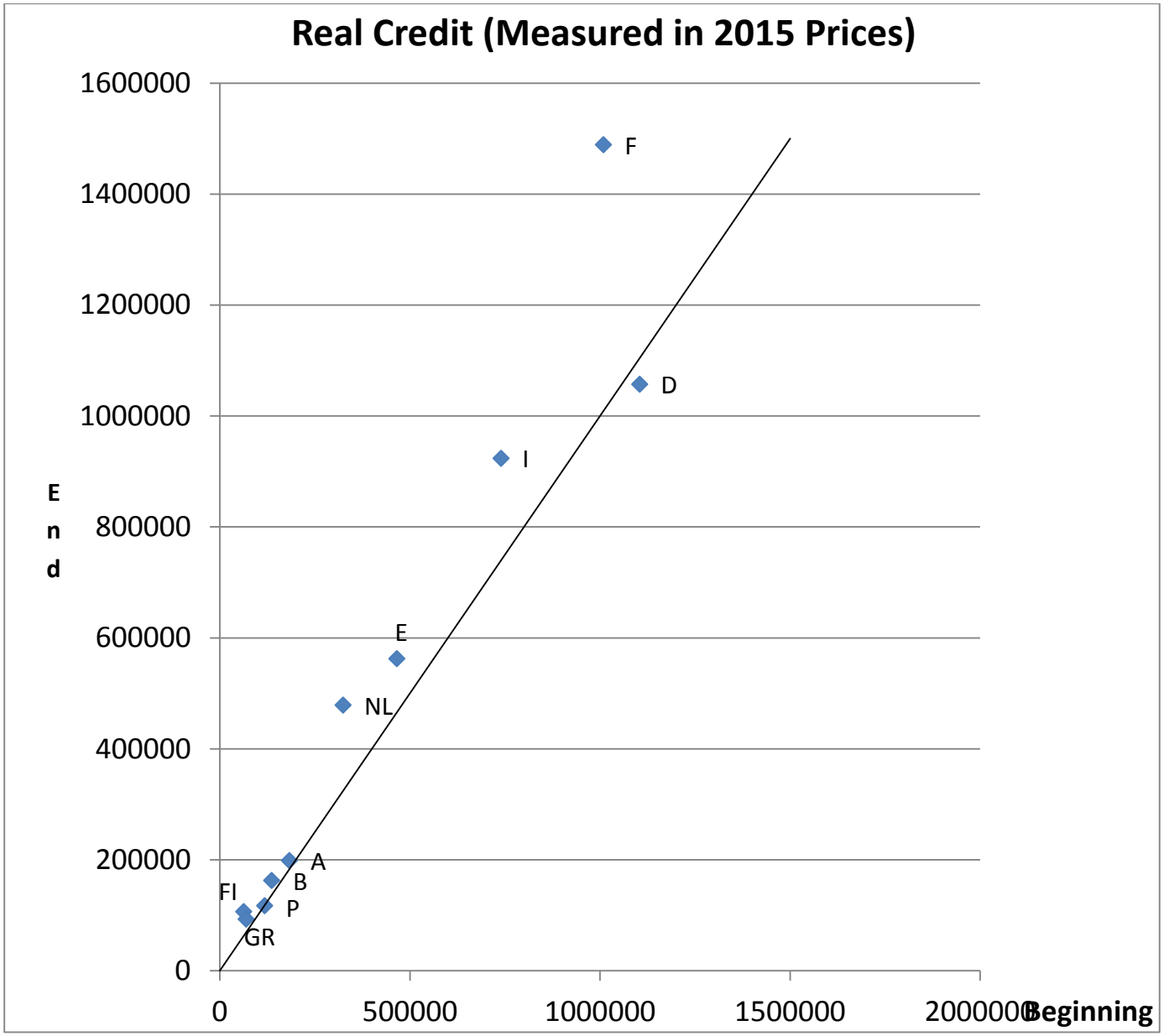
[2] Average of first (last) four observations of credit divided by the level of GDP at market prices in 2002 (2015).

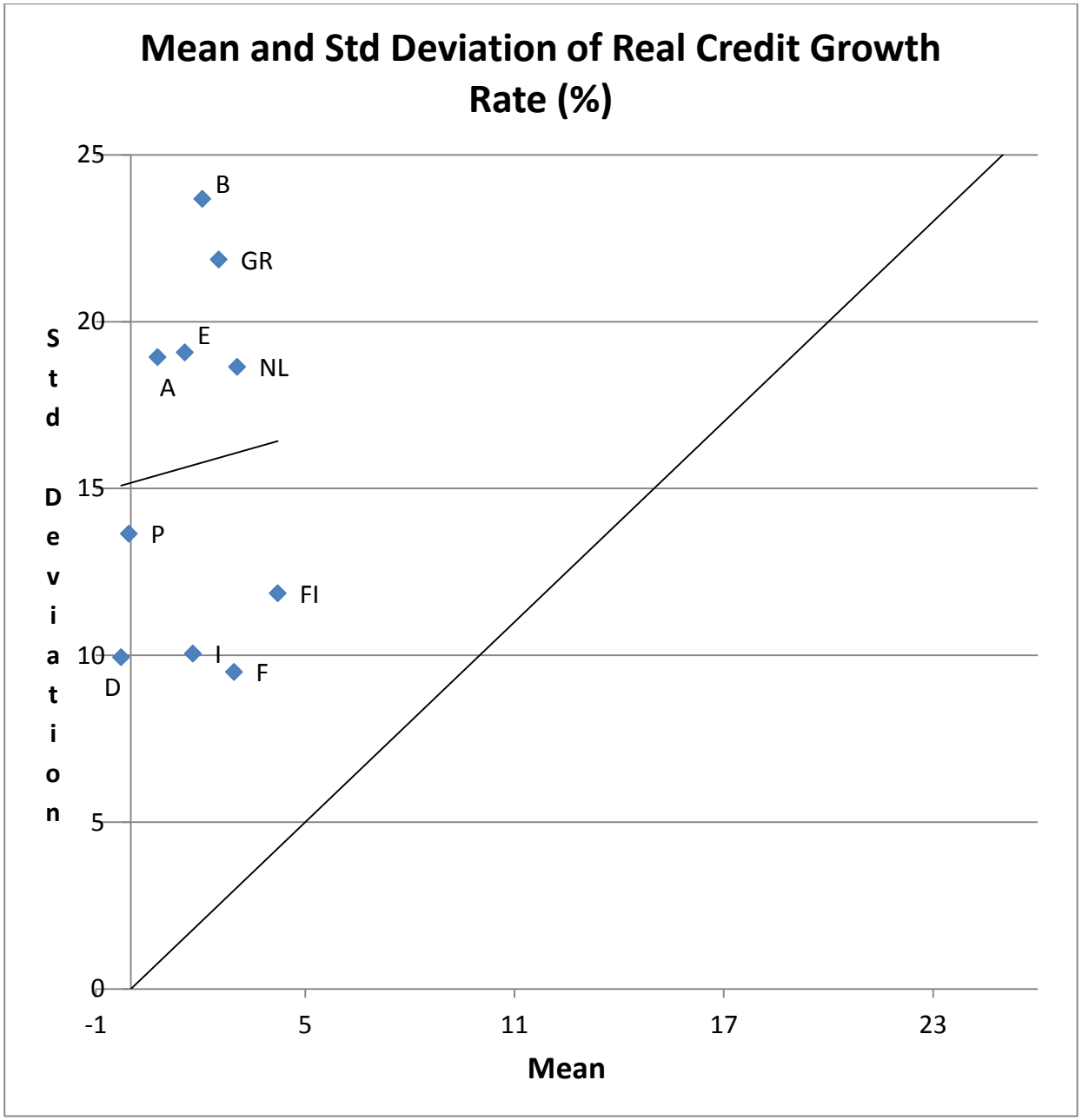
[3] Sample period ends in 2016m02.

[4] Annualized.

Real credit is defined as $\frac{C_B+C_H}{CPI} * 100$ where CPI = 100 in 2015.

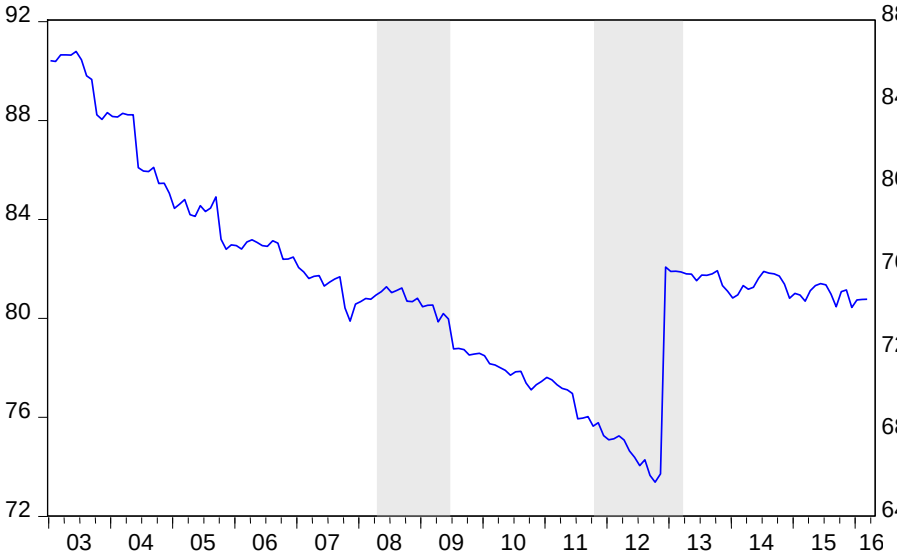
The credit to nominal GDP (NGDP) ratio is defined as $\frac{C_B+C_H}{NGDP}$.


Real Credit (Measured in 2015 Prices)
1600000
1400000
1200000
1000000
800000
600000
400000
200000
0
End
0
500000
1000000
1500000
2000000
Beginning
F
D
I
E
NL
A
B
P
FI
GR

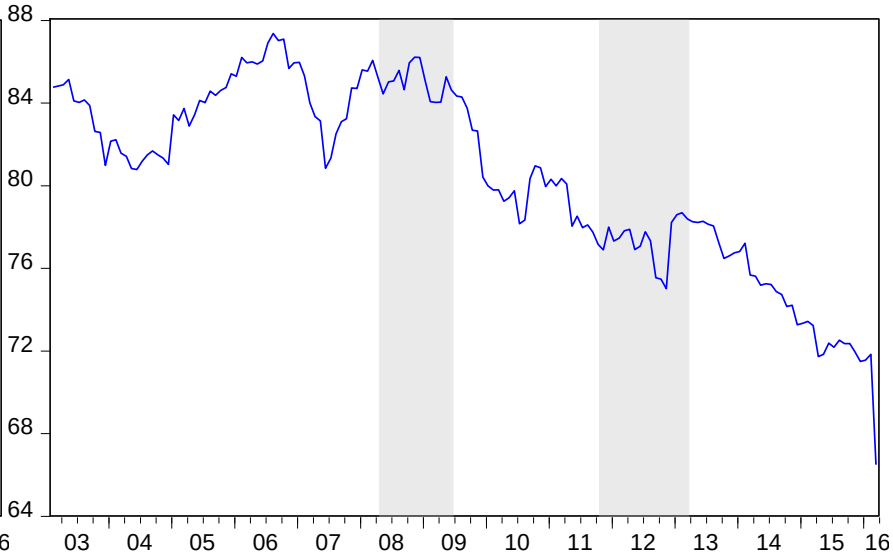

Mean and Std Deviation of Real Credit Growth Rate (%)
Std Deviation
Mean
25
20
15
10
5
0
-1
5
11
17
23
B
GR
E
NL
A
P
FI
I
F
D

$$\textbf{Finance Mix} = \frac{LNFC}{LNFC+SECNFC}$$

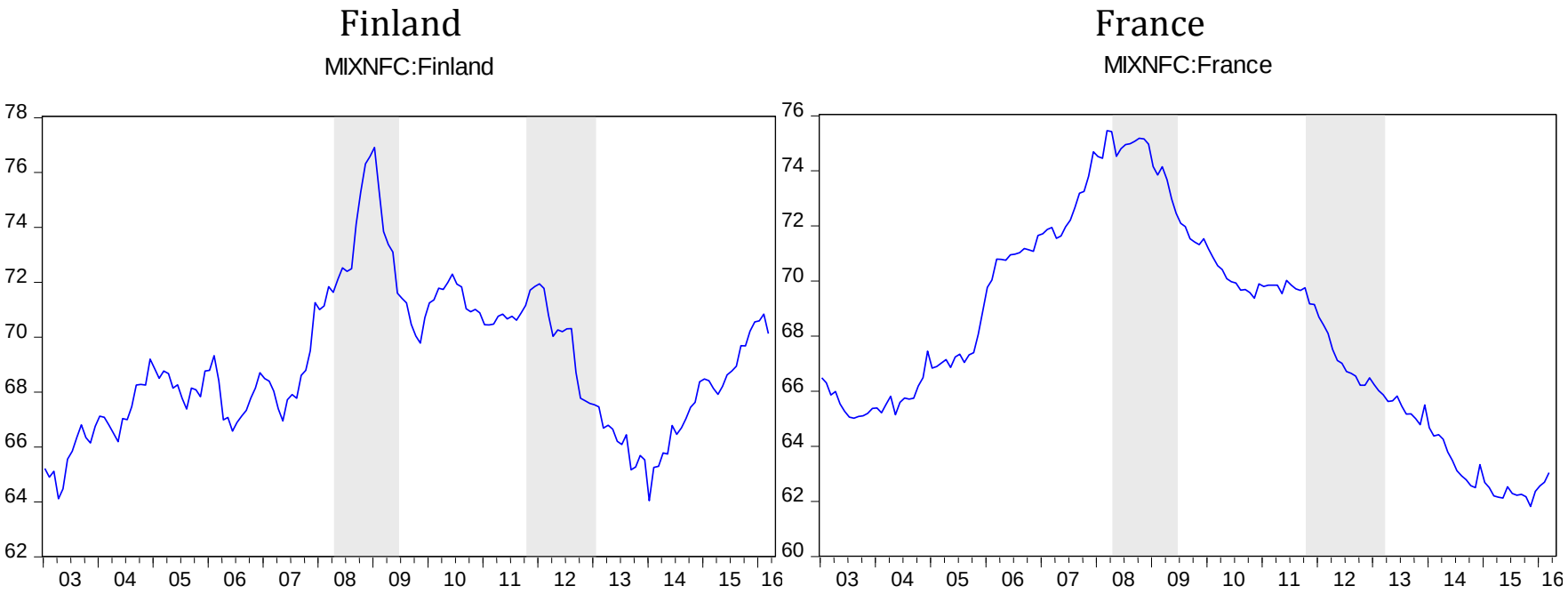
Austria



Belgium

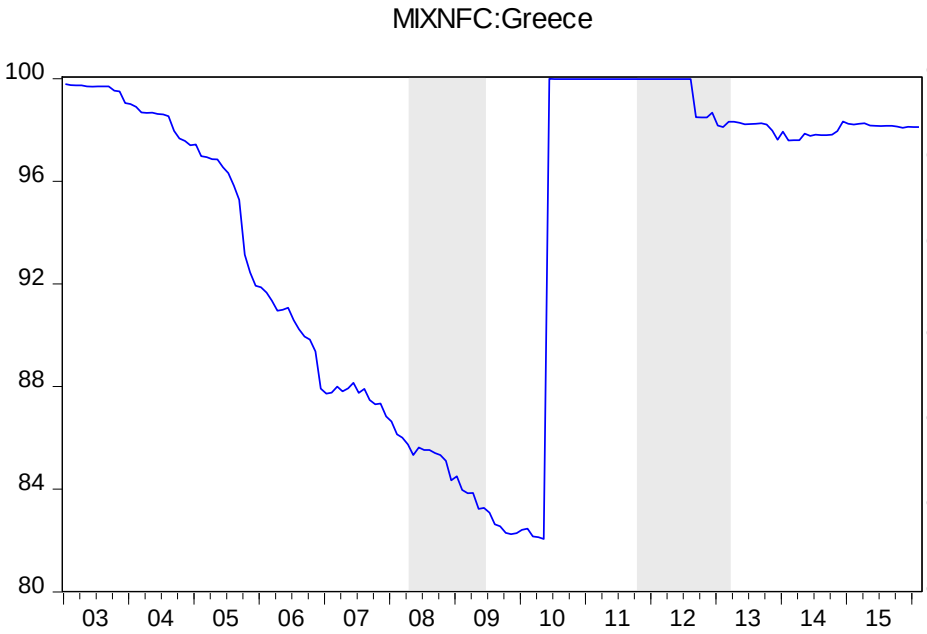


- Sustained decrease in the mix in both countries.
- Reversal sets in during second recession in Austria.

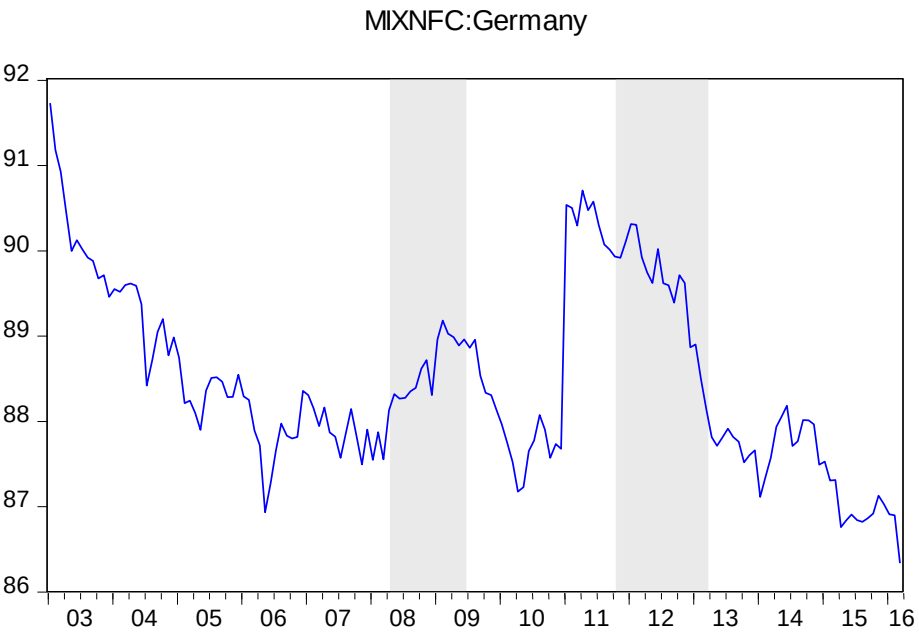


- Bond market financing not trivial in both countries.
- Mix peaks in Finland during first recession. France experiences similar phenomenon.
- Gradual decrease in mix in France starts right around the middle of the first recession.

Greece

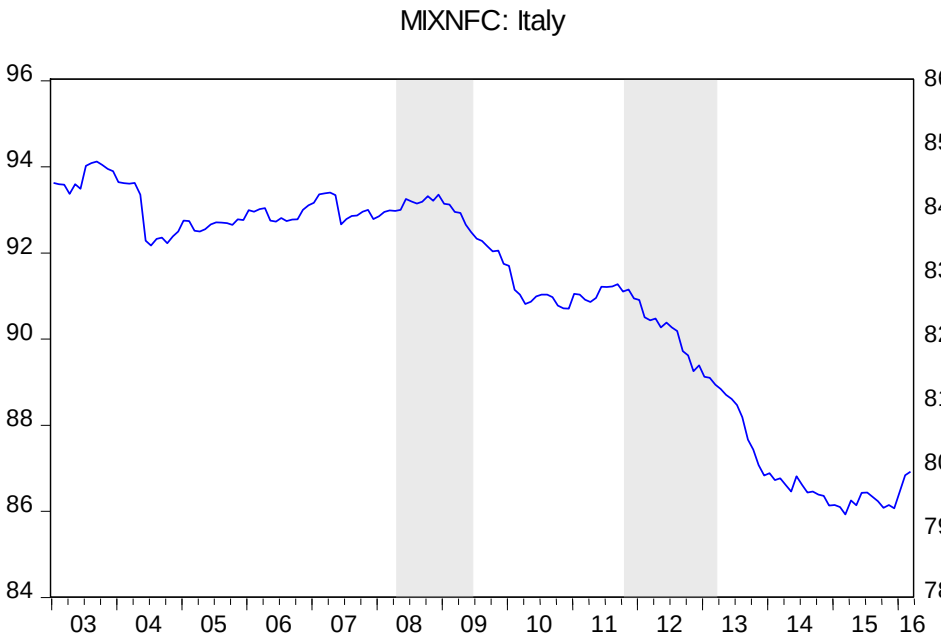


Germany

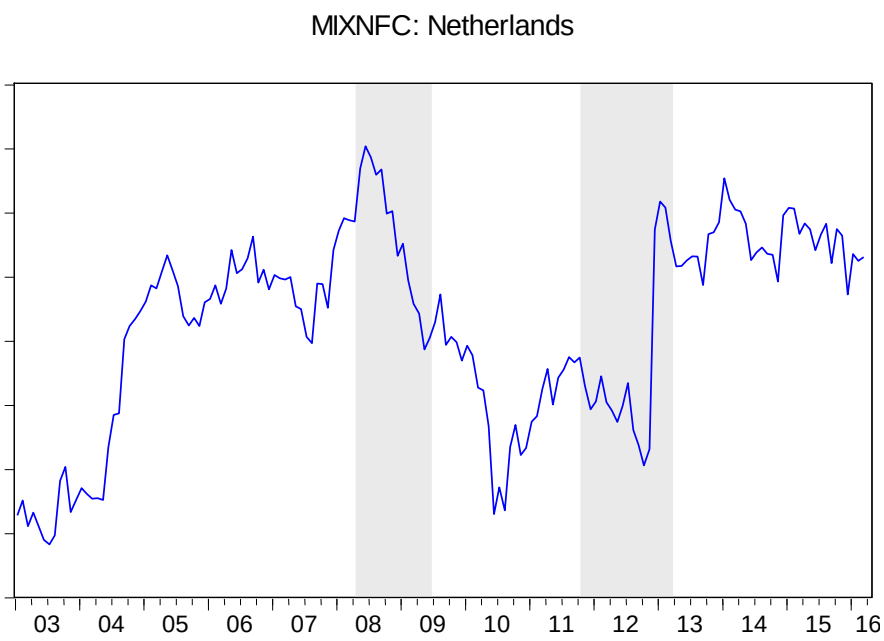


- Bond finance is trivial in Greece and of marginal importance in Germany.
- In Greece bond market shut down in the run-up to the debt crisis.
- In Germany its importance has increased relative to the start of the sample period.

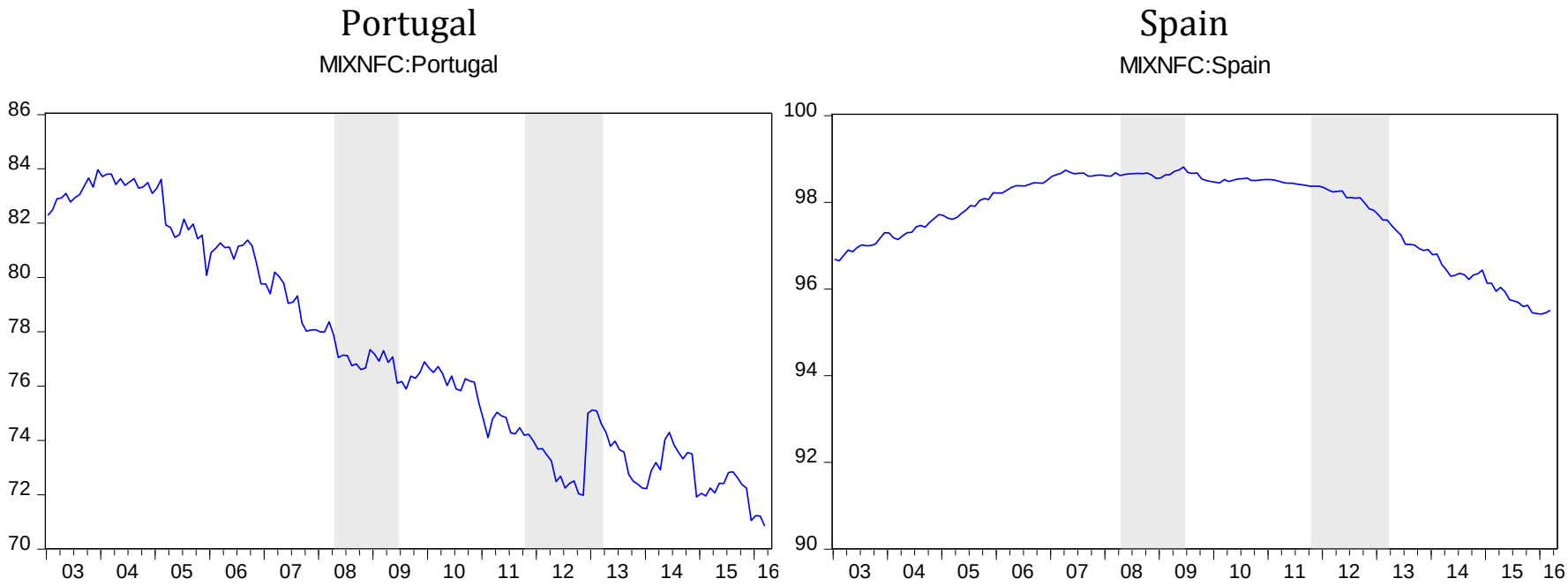
Italy



Netherlands



- In Italy bond market's share of total credit has increased over time.
- Just the opposite is the case in the Netherlands.
- Idiosyncratic pattern of mix during the two recessions in the Netherlands.



- Secular decrease in the mix in Portugal. Bond finance is becoming relatively more important.
- Bond finance is trivial in Spain.

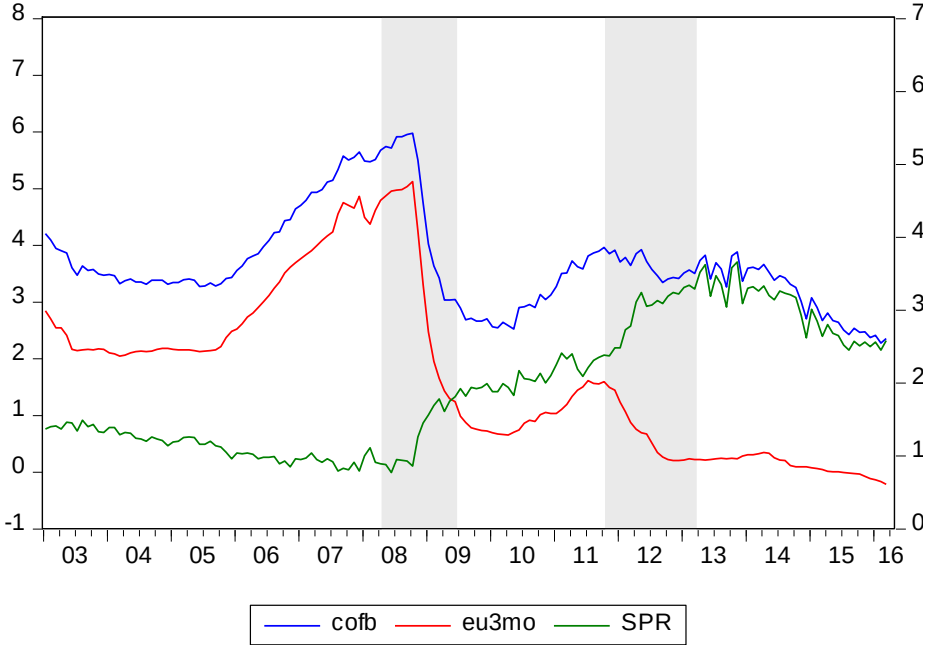
1. Interest Rates and Credit Spreads

- Correlation of Spread and ECB-Spread is very high:

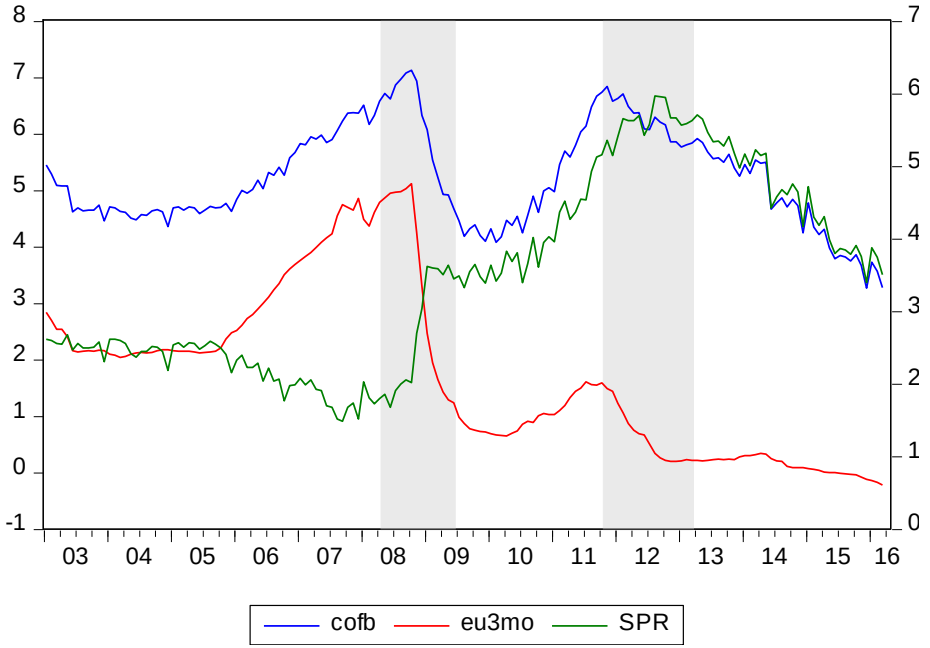
AUS	BEL	FIN	FRA	GER	GRE	ITA	NL	POR	SPA
0.94	0.94	0.98	0.87	0.94	0.99	0.98	0.89	0.98	0.99

- As a result, the ECB Spread is not included in the graphs below.
- In the graphs to follow interest rates are measured on the left-hand axis while the spread is measured on the right-hand axis.

Spain

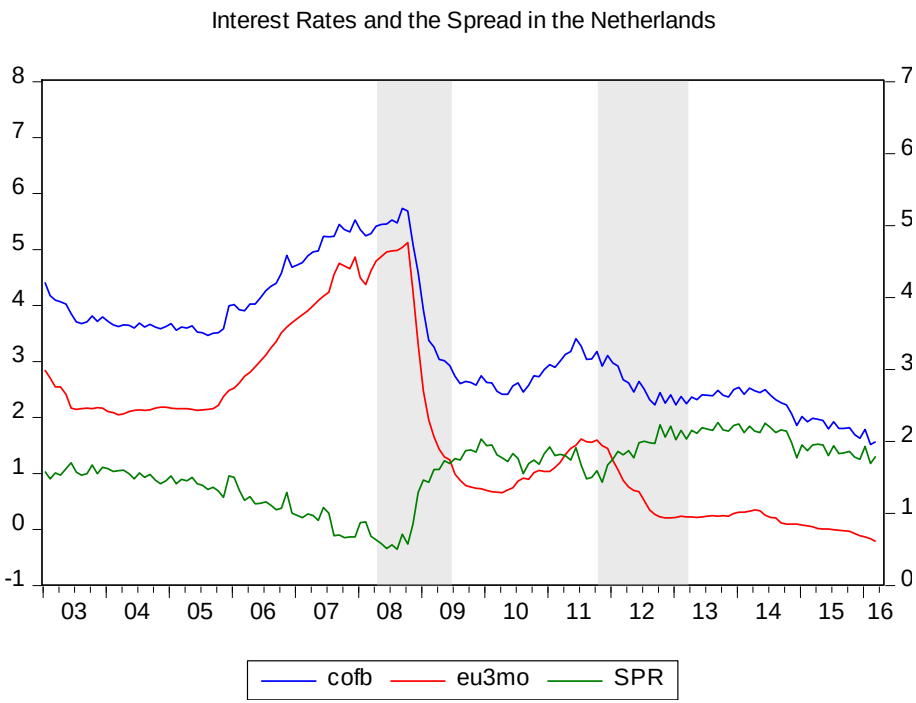


Portugal

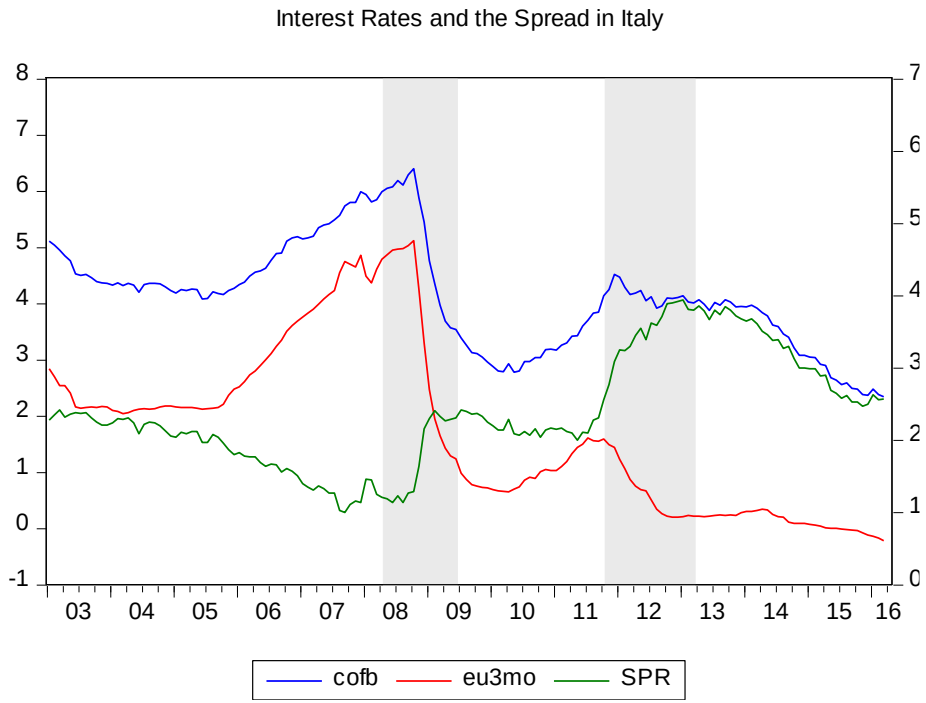


- Gradual decrease followed by marked increase in the spread.
- Spread rises rapidly during the first recession and continues to ratchet upward thereafter.
- It is higher at the end of the sample period than at the beginning.

Netherlands

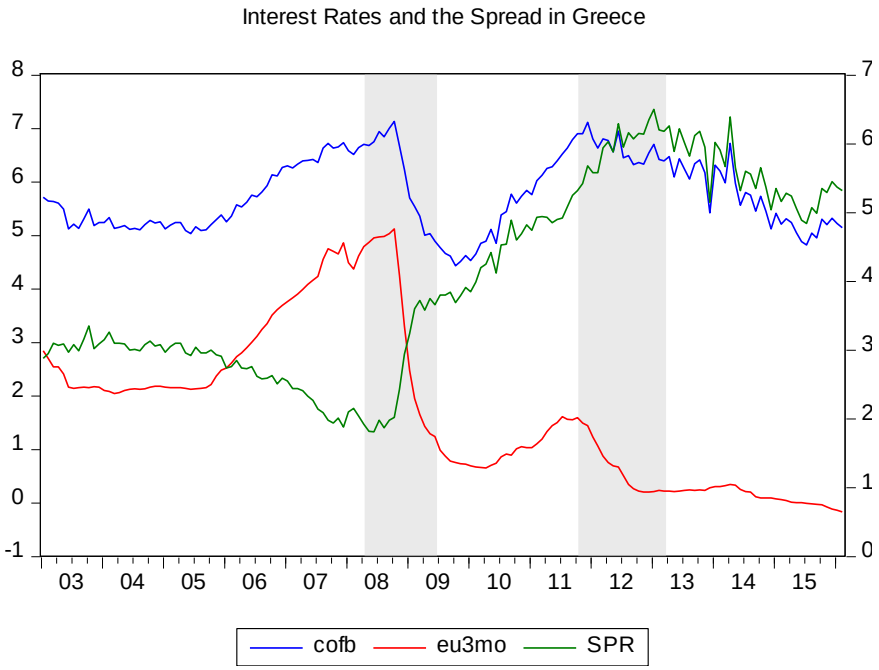


Italy

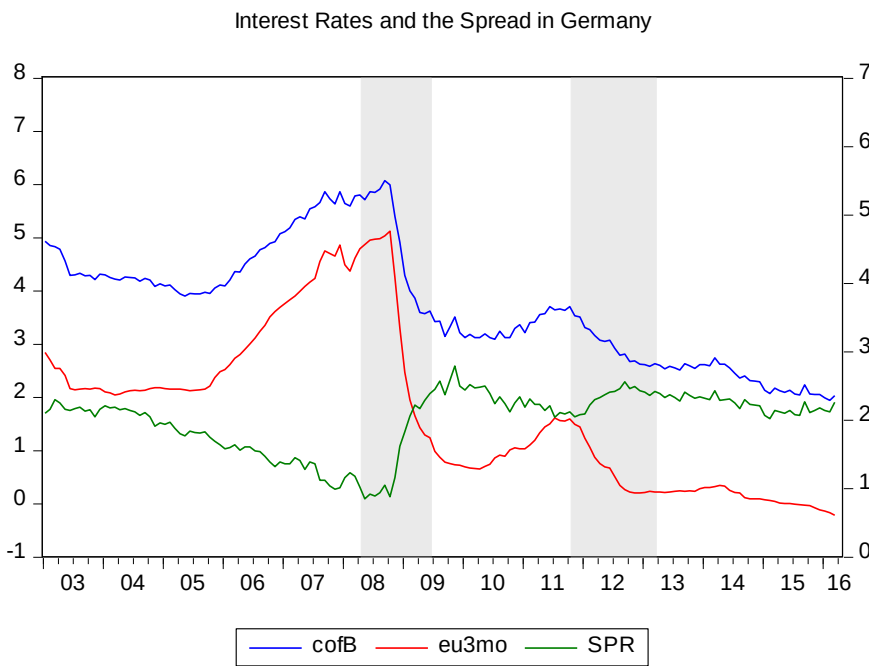


- No marked increase in spread during the second recession in the Netherlands
- Very different story in Italy.

Greece

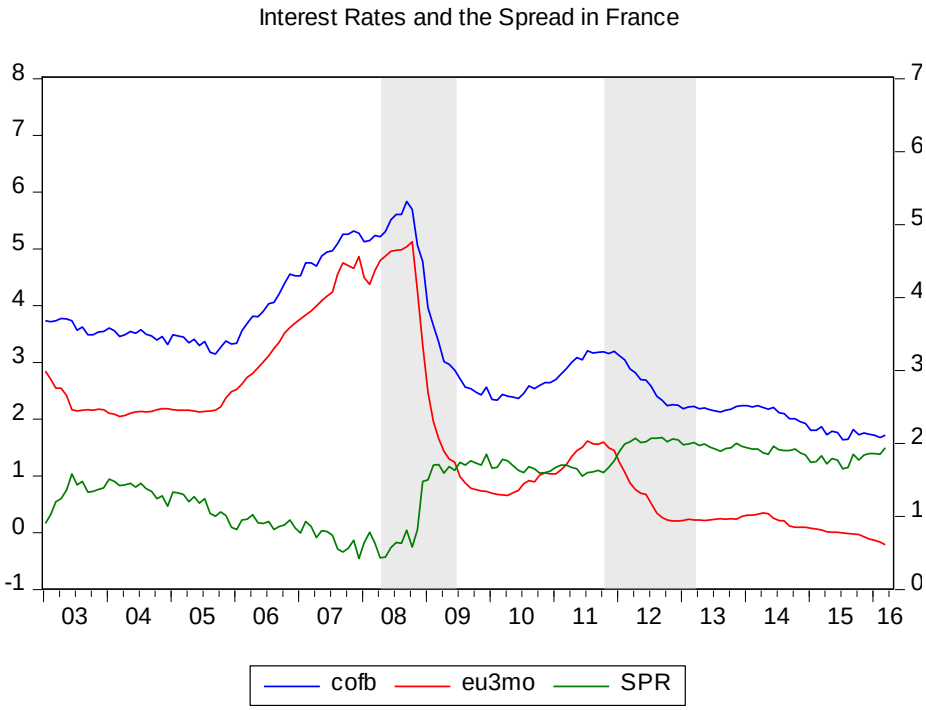


Germany

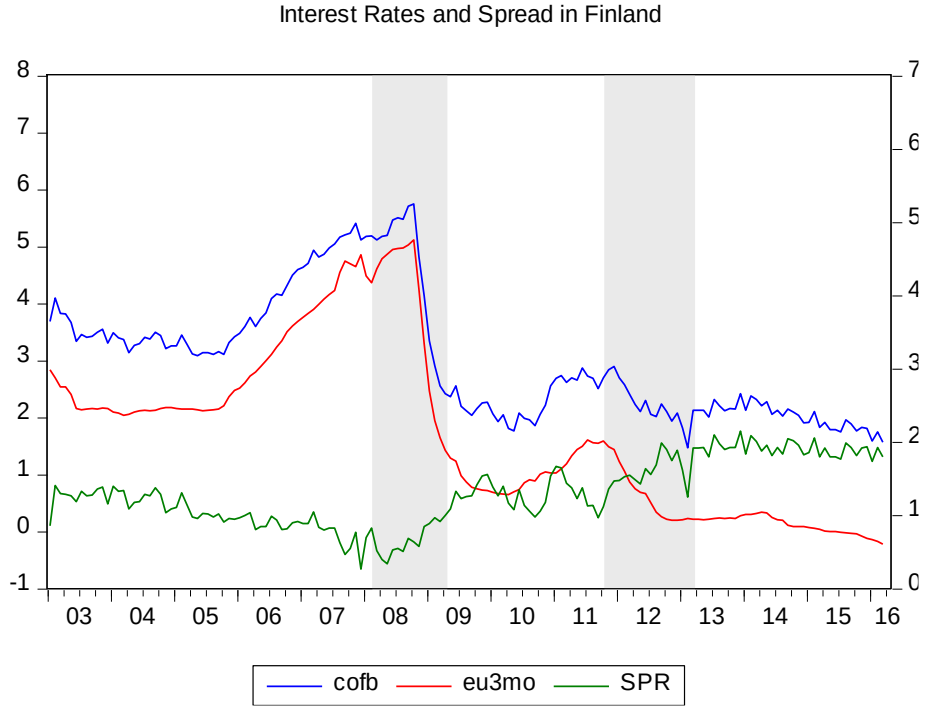


- In Greece, spread decreases initially but then spikes upward in first recession, rises rapidly during interim, and peaks during second recession.
- In Germany, the spread also decreases initially, spikes upward during the first recession but increases only moderately during second recession.

France

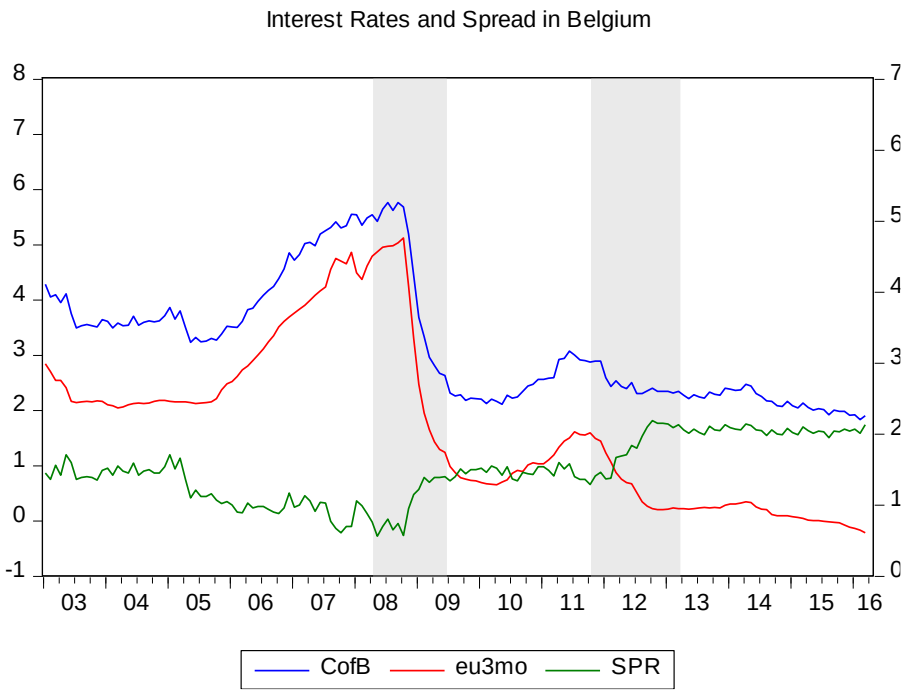


Finland

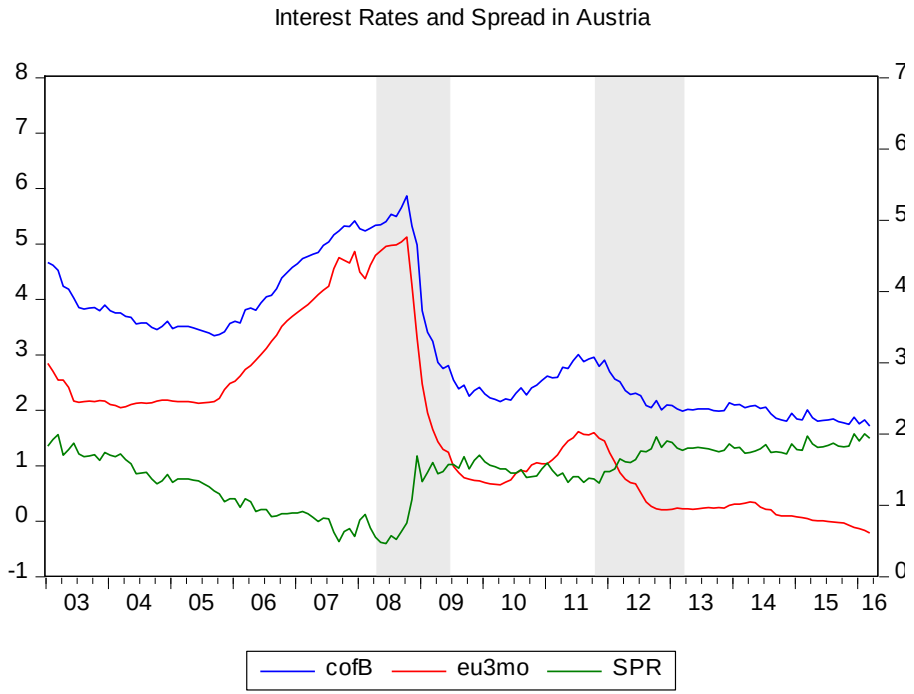


- In France and Finland spread is relatively low at beginning of sample and continues to decrease.
- During first recession, spread spikes upward in France and rises more gradually in Finland.
- No sustained upward movement in France during second recession or thereafter.
- In Finland a slight upward trend in the spread sets in at the start of the second recession.

Belgium



Austria



- Downward drift of the spread in both countries initially, followed by a substantial rise during the first recession.
- Further increase in spread during second recession, reaching a new plateau at roughly the 2 percent mark.

Table 5: Summary Statistics of the 'Spread' over the 2003m1- 2016m3 Sample Period

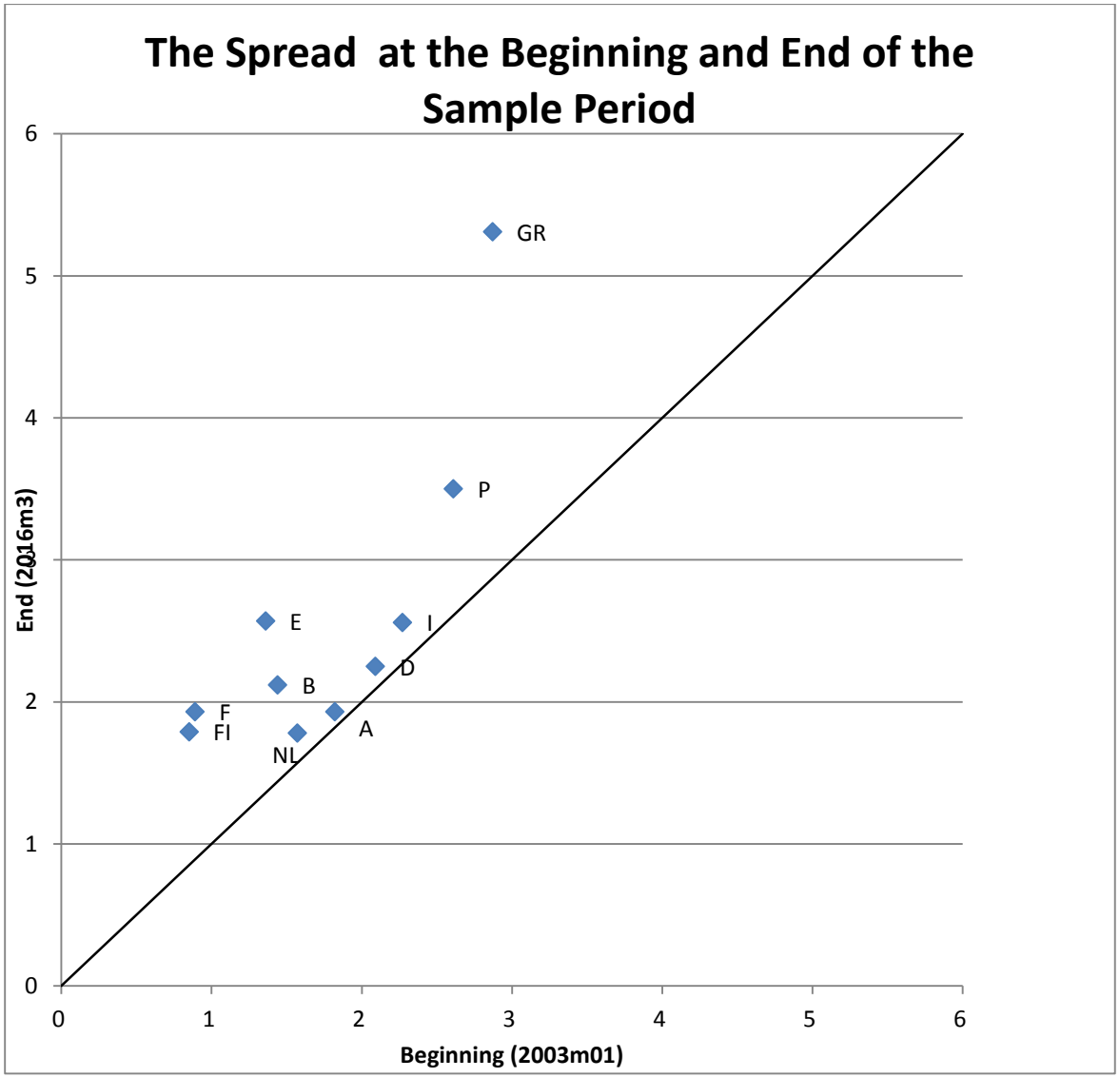
Country	**Beginning**	**End**	**Min**	**Max**	**Mean**	**Std. Dev.**	**(Min,Max) Rec. 1**	**(Min,Max) Rec. 2**
Austria	1.82	1.93	0.45	1.99	1.43	0.40	(**0.45**, 1.68)	(1.30, 1.95)
Belgium	1.44	2.12	0.55	2.18	1.48	0.44	(**0.55**, 1.39)	(1.28, **2.18**)
Finland	0.85	1.79	0.26	2.14	1.30	0.45	(0.33, 1.32)	(1.11, 1.98)
France	0.89	1.93	0.41	2.07	1.44	0.46	(0.42, 1.70)	(1.59, **2.07**)
Germany	2.09	2.25	0.84	2.78	1.99	0.44	(**0.84**, 2.38)	(2.04, 2.55)
Greece[1]	2.87	5.31	1.80	6.49	4.02	1.41	(**1.80**, 3.74)	(5.31, **6.49**)
Italy	2.27	2.56	0.99	3.93	2.38	0.78	(1.13, 2.40)	(2.55, **3.93**)
Netherlds.	1.57	1.78	0.49	2.25	1.58	0.44	(**0.49**, 1.72)	(1.42, 2.22)
Portugal	2.61	3.50	1.48	5.96	3.48	1.31	(1.67, 3.63)	(5.14, **5.96**)
Spain	1.36	2.57	0.76	3.65	1.93	0.87	(**0.76**, 1.80)	(2.36, 3.33)

[1] Sample period ends 2016m2.

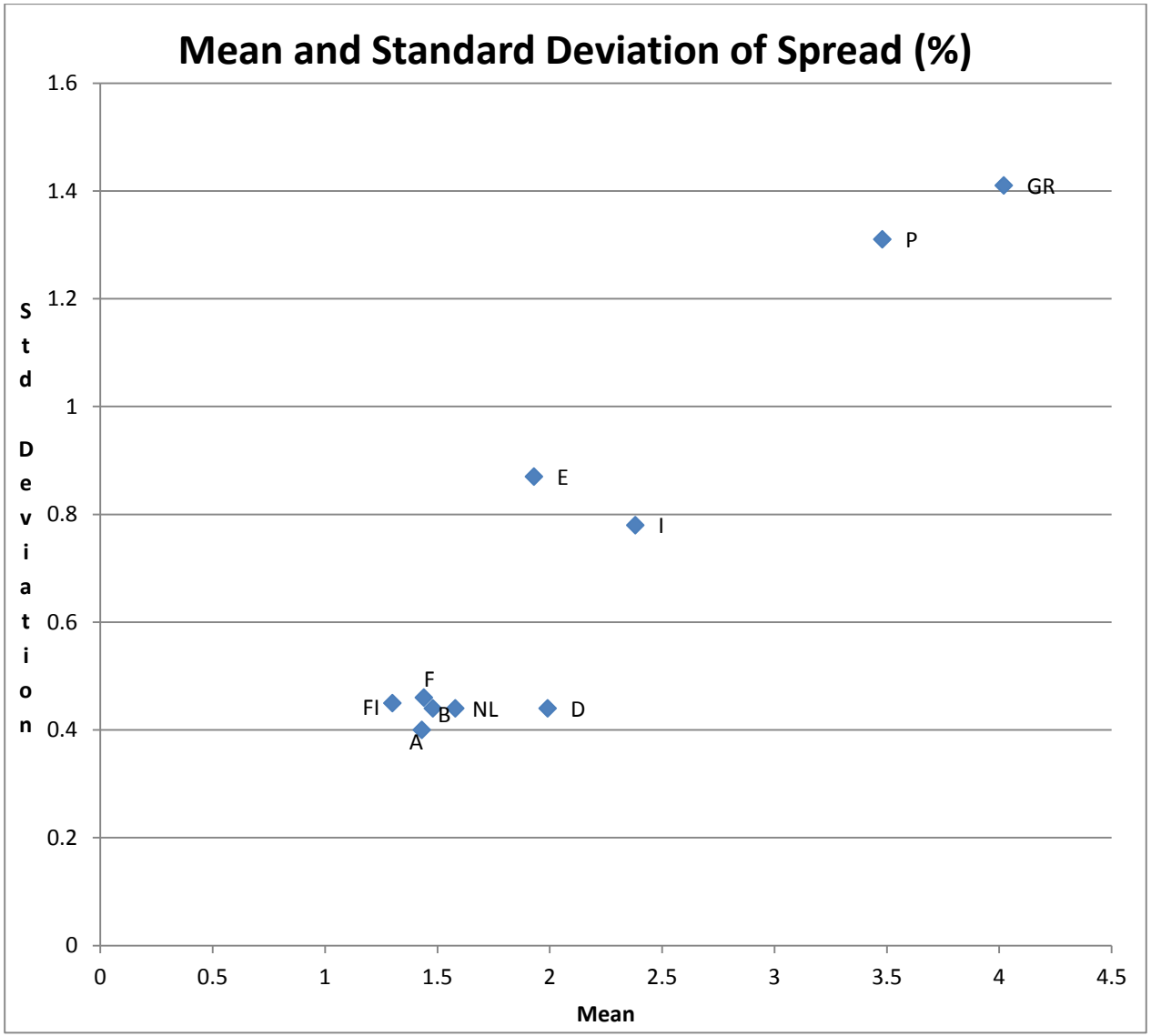
Recession 1: 2008m4 - 2009m6

Recession 2: 2011m10 – 2013m3 (According to CEPR)

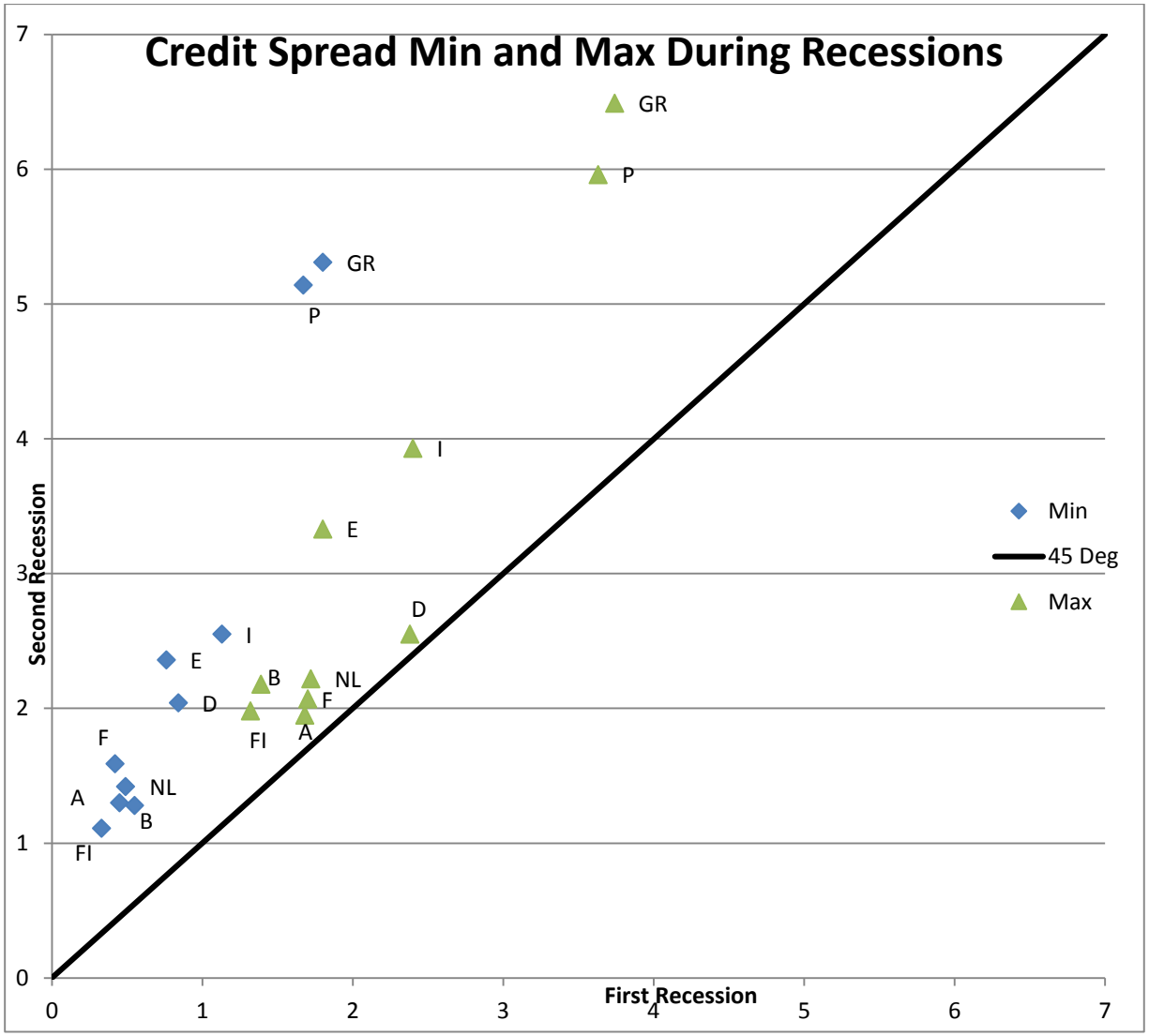
- Number in bold face indicates that sample min or max occurs during recession
- Next, a few simple graphs to illustrate that the ACS view of the world may hold some truth.



Credit Spread has risen: risk premium has increased.



- Clear positive relationship between mean and variability of the spread in the South.
- Marked difference between moments on Southern flank and the center-north of the Euro area.



Clear indication that credit spreads are higher in second than in first recession.

Interpreting the Evidence on Finance Mix vs Credit Spreads

- No cohesive pattern in the finance mix variable across countries
  - Secular decline, initial decline followed by sharp reversal, steady increase followed by sharp reversals, mean-reverting, etc.
- Far more cohesive pattern in the credit spread
  - Gradual steady decline in the spread in the period leading up to the **GFC**
  - Upward spike in the first recession
  - Steady or further upward movements in spread in the inter-recession period
  - Continuation of increase in spread during second recession in GR, I, P, and E with increases in the other countries ranging from minor to moderate.
  - Decreases in the spread from end of recession to end of sample period in the South but not in the other countries.

Econometric Results

1. Specification of first regression equation estimated:

$$\Delta y_t = a_0 + \sum_{i=1}^{l} a_i \, \Delta y_{t-i} + \sum_{i=1}^{m} b_i \, \Delta spr_{t-i} + \sum_{i=1}^{n} c_i \, \Delta mix_{t-i} + e_t$$

where Δy = first difference of an annualized measure of economic activity

Δspr = change of the spread between the cost of borrowing for NFC (non-financial corporations) and the euro-area 3-month money market interest rate.

$$\Delta mix = \Delta\left(\frac{Loans\ to\ NFC}{Loans\ to\ NFC + Securities\ issued\ by\ NFC}\right)$$

2. Second specification identical to first except that $\Delta ECBspr$ replaces Δspr.
3. Tests
   - F-test statistic: F test of the hypothesis that m (n) lags of the change in the spread (finance mix)are jointly insignificant. Number in brackets is the probability that null hypothesis can be be rejected (p-value).
   - t-test statistic: test of the hypothesis that the sum of the coefficients (SoC) $b_i(c_i)\ \ i = 1, 2, \ldots m\ (n)$ on $\ m\ (n)\ $ lags of the spread (finance mix) equals zero. The number reported at the top of the cell is the sum of the coefficients. The number below in parentheses is the standard error.
   - 'Expected' sign on spread and ECB-spread: (-) for IP, RS, and CT, (+) for UR.
   - 'Expected' sign on mix: (+) for IP, RS, and CT, (-) for UR.

Table 6: The Effects of the Spread and the Finance Mix on Measures of Economic Activity: 2004:02 -2016:m03

	Industrial Production				Retail Sales				Unemployment Rate			
	Lags(l,m,n)	$\bar{R}^2$	F [p-val]	t (SoC)	Lags(l,m,n)	$\bar{R}^2$	F [p-val]	Wald	Lags(l,m,n)	$\bar{R}^2$	F[p-val]	t (SoC)
Austria	(18,12,12)	0.89	*2.52*** *[0.01]*	*-24.47*** *(11.19)*	(24,18,24)	0.57	*1.84*** *[0.04]*	*0.17 (5.55)*	(18,18,18)	0.54	*1.53** *[0.10]*	*0.44 (0.45)*
			0.58 [0.85]	-0.90* (0.55)			1.35 [0.17]	-2.51*** (0.81)			0.92 [0.55]	0.059* (0.034)
Belgium	(12,12,12)	0.79	*1.01 [0.44]*	*-28.81*** *(11.63)*	(12,12,12)	0.58	*0.83 [0.62]*	*-3.97 (3.43)*	(12,12,12)	0.60	*1.49 [0.14]*	*1.01** *(0.51)*
			1.46 [0.15]	-1.87 (1.20)			1.36 [0.19]	0.58 (0.66)			0.68 [0.77]	0.04 (0.05)
Finland	(12,12,12)	0.87	*1.78** *[0.06]*	*-58.84*** *(16.60)*	(12,12,12)	0.77	*0.17 [0.99]*	*-0.99 (8.29)*	(18, 12,12)	0.86	*1.02 [0.44]*	*0.24 (0.20)*
			2.73*** [0.01]	-5.99*** (2.09)			0.62 [0.82]	-0.99 (0.77)			0.87 [0.57]	0.03 (0.02)
France	(24,18,18)	0.89	*1.23 [0.26]*	*-13.10 (12.64)*	(12,12,12)	0.64	*1.95** *[0.04]*	*-5.15** *(2.77)*	(12,12,12)	0.49	*2.12** *[0.02]*	*0.28 (0.37)*
			1.02 [0.45]	-1.06 (1.15)			1.97** [0.03]	-0.45 (0.62)			0.49 [0.91]	-0.04 (0.04)
Germany	(24,12,12)	0.95	*1.31 [0.24]*	*7.97 (11.65)*	(24,12,12)	0.59	*1.45 [0.16]*	*-3.87 (3..48)*	(24,18,18)	0.96	*1.71** *[0.05]*	*0.04 (0.06)*
			1.96** [0.04]	-5.87 (3.75)			0.67 [0.77]	-1.76 (1.35)			1.35 [0.18]	-0.029* (0.016)

	Industrial Production				Retail Sales				Unemployment Rate			
	Lags(l,m,n)	$\bar{R}^2$	F [p-val]	t (SoC)	Lags(l,m,n)	$\bar{R}^2$	F [p-val]	Wald	Lags(l,m,n)	$\bar{R}^2$	F[p-val]	t (SoC)
Greece	(12,12,12)	0.58	*1.29 [0.23]* 1.13 [0.34]	*-7.68 (7.23)* -1.08*** (0.31)	(24,12,18)	0.88	*0.76 [0.68]* 1.96** [0.02]	*-2.96 (7.37)* -1.72*** (0.49)	(24,12,24)	0.69	*1.77* [0.07]* 1.93*** (0.01)	*0.78*** (0.30)* 0.27*** (0.06)
Italy	(24,12,24)	0.95	*1.64* [0.1]* 1.85** [0.02]	*-7.35* (4.49)* 0.18 (2.73)	(18,12,12)	0.84	*1.45 [0.16]* 1.00 [0.45]	*-1.95 (2.08)* 0.20 (1.10)	(12,12,12)	0.20	*1.97** [0.03]* 0.49 [0.92]	*1.68*** (0.47)* -0.29 (0.26)
Netherlands	(18,12,12)	0.62	*0.70 [0.75]* 0.52 [0.90]	*-7.81 (12.94)* 0.07 (2.24)	(24,12,24)#	0.87	*2.15** [0.02]* 1.73** [0.04]	*-26.04*** (9.88)* 1.80 (1.12)	(18,12,18)	0.54	*2.28*** [0.01]* 1.94** [0.02]	*0.96*** (0.25)* 0.02 (0.07)
Portugal	(12,12,18)	0.64	*1.86** [0.05]* 1.04 [0.43]	*-14.82** (6.50)* -2.90 (4.60)	(12,12,12)	0.75	*0.95 [0.50]* 1.51 [0.13]	-2.21 (2.98) 5.42*** (1.67)	(12,12,18)	0.34	*1.21 [0.29]* 0.59 [0.90]	0.82*** (0.33) -0.29 (0.26)
Spain	(12,12,12)	0.92	*1.02 [0.43]* 0.81 [0.64]	*-7.06 (9.01)* 1.46 (3.17)	(18,12,12)	0.92	*1.79** [0.05]* 0.76 [0.69]	*-14.48 (9.63)* 1.48 [3.93]	(12,12,12)	0.85	*0.90 [0.55]* 1.00 [0.46]	*-0.41 (0.60)* 0.16 (0.16)

	Turnover of Capital Goods											
	Lags(l,m,n)	$\bar{R}^2$	F [p-val]	t (SoC)	Lags(l,m,n)	$\bar{R}^2$	F [p-val]	t (SoC)	Lags(l,m,n)	$\bar{R}^2$	F[p-val]	t (SoC)
Austria (2007:07-2016:03)	(18,12,12)	0.80	*1.69** *[0.09]* 1.11 [0.36]	*-33.54 (23.20)* 0.87 (1.55)								
Belgium	(18,12,12)	0.77	*0.89 [0.56]* 2.07** [0.03]	*-37.68** *(20.18)* -0.56 (2.60)								
Finland	(18,12,12)	0.73	*1.14 [0.34]* 1.61* [0.10]	*-108.02**** *(39.74)* -9.17** (4.66)								
France	(12,12,12)	0.64	*2.77**** *[0.01]* 0.61 [0.84]	*-54.73**** *(16.24)* -1.25 (2.16)								
Germany	(24,12,12)	0.89	*1.61** *[0.10*] 1.45 [0.16]	*-15.05 (19.82)* -13.66** (6.58)								

	Turnover of Capital Goods											
	Lags(l,m,n)	$\bar{R}^2$	F [p-val]	t (SoC)	Lags(l,m,n)	$\bar{R}^2$	F [p-val]	t (SoC)	Lags(l,m,n)	$\bar{R}^2$	F[p-val]	t (SoC)
Greece	(24,12,12)#	0.60	*1.80*** *[0.05]* 1.46 [0.15]	*-56.25**** *(19.56)* 0.87 (1.89)								
Italy	(12,12,12)	0.66	*2.49**** *[0.01]* 1.82** [0.02]	*-34.29*** *(16.56)* 18.21** (9.10)								
Netherlands	(24,12,18)	0.74	*1.41* *[0.18]* 1.09 [0.38]	*-78.37**** *(30.57)* 7.80 (7.22)								
Portugal[1]	(12,12,12)	0.36	*0.79* *[0.66]* 1.58* [0.10]	*-11.05* *(8.04)* -7.70 (9.75)								
Spain	(24,12,12)	0.79	*1.00* *[0.46]* 1.07 [0.39]	*-42.04*** *(20.71)* 5.05 (9.18)								

Notes: 1. The turnover of capital goods series for Portugal is clearly stationary. Hence the log of the this series appears in the regression specification.

Table 7: The Effects of the **ECB-Spread** and the Finance Mix on Measures of Economic Activity: 2004:02 -2016:m03

	Industrial Production				Retail Sales				Unemployment Rate			
	Lags(l,m,n)	$\bar{R}^2$	F [p-val]	t (SoC)	Lags(l,m,n)	$\bar{R}^2$	F [p-val]	t (SoC)	Lags(l,m,n)	$\bar{R}^2$	F[p-val]	t (SoC)
Austria	(18,12,12)	0.88	*1.87*** *[0.05]* 0.64 [0.80]	*-17.11 (12.18)* -0.64 (0.68)	(24,18,24)	0.59	*2.12**** *[0.01]* 1.52* [0.09]	*-3.16 (7.97)* -2.43*** (0.76)	(18,18,18)	0.54	*1.52** *[0.10]* 1.18 [0.30]	*0.40 (0.66)* 0.06 0.04
Belgium	(12,12,12)	0.79	*1.17 [0.31]* 1.61* [0.10]	*-28.04*** (14.64)* -1.87 (1.20)	(12,12,12)	0.57	*0.78 [0.67]* 1.35 [0.20]	*-4.72 (4.39)* 0.61 (0.70)	(12,12,12)	0.63	*2.21**** *[0.01]* 1.01 [0.44]	*0.86 (0.58)* 0.04 (0.05)
Finland	(18,12,12)	0.89	*2.00*** *[0.03]* 2.76*** [0.01]	*-62.03**** (13.42)* -6.40*** (1.87)	(12,12,12)	0.77	*0.31 [0.99]* 0.93 [0.52]	*-13.03** (7.43)* -1.79** (0.81)	(18, 12,12)	0.86	*0.82 [0.63]* 0.78 [0.67]	*0.25 (0.18)* 0.03 (0.02)
France	(24,18,18)	0.89	*1.20 [0.27]* 0.98 [0.49]	*-13.46 (12.11)* -1.45 (1.34)	(18,12,12)	0.62	*1.29 [0.23]* 1.66* [0.08]	*-1.65 (4.51)* -0.06 (0.60)	(12,12,12)	0.49	*1.94*** *[0.04]* 0.99 [0.47]	*0.53 (0.38)* -0.01 (0.04)
Germany	(24,12,12)	0.95	*1.98*** *[0.03*] 2.01** [0.03]	*21.94 (13.87)* -7.60*** (3.08)	(24,12,12)	0.59	*1.66** *[0.09]* 0.82 [0.63]	*-7.17** (4.22)* -2.34** (1.07)	(24,18,18)+	0.95	*0.96 [0.51]* 0.89 [0.59]	*-0.12 (0.11)* -0.028* (0.017)

	Industrial Production				Retail Sales				Unemployment Rate			
	Lags(l,m,n)	$\bar{R}^2$	F [p-val]	t (SoC)	Lags(l,m,n)	$\bar{R}^2$	F [p-val]	t (SoC)	Lags(l,m,n)	$\bar{R}^2$	F[p-val]	t (SoC)
Greece	(12,12,12)	0.57	*1.23* *[0.27]* 1.22 [0.28]	*-7.27* *(8.39)* -0.96** (0.47)	(24,12,18)	0.88	*0.66* *[0.78]* 1.94** [0.02]	*-7.00* *(9.39)* -1.60*** (0.49)	(24,12,24)	0.69	*1.92*** *[0.05]* 1.90** (0.02)	*1.02**** *(0.41)* 0.18*** (0.04)
Italy	(24,12,24)+	0.95	*1.47* *[0.15]* 1.84** [0.02]	*-5.08* *(3.63)* -0.75 (3.05)	(18,12,12)	0.84	*1.64** *[0.09]* 1.02 [0.44]	*-3.52* *(2.31)* 0.08 (1.04)	(12,12,12)	0.18	*1.68** *[0.08]* 0.42 [0.95]	*1.74**** *(0.63)* -0.19 (0.26)
Netherlands	(24,12,24)	0.62	*0.43* *[0.95]* 0.67 [0.86]	*-2.74* *(16.94)* -0.51 (3.34)	(24,12,24)#	0.85	*1.08* *[0.39]* 1.25 [0.24]	*-11.86* *(7.54)* 0.05 (1.79)	(24,12,18)	0.50	*1.63** *[0.10]* 1.80** [0.04]	*1.15**** *(0.41)* 0.01 (0.06)
Portugal	(12,12,18)	0.64	*1.75** *[0.07]* 0.95 [0.52]	*-15.24*** *(6.66)* -1.42 (4.58)	(12,12,12)	0.75	*1.08* *[0.38]* 1.47 [0.15]	-2.95 (3.13) 5.20*** (1.71)	(12,12,12)	0.33	*1.04* *[0.42]* 0.77 [0.68]	0.65** (0.30) -0.21 (0.20)
Spain	(12,12,12)	0.92	*0.97* *[0.48]* 0.79 [0.66]	*-3.81* *(6.95)* 1.24 (2.85)	(18,12,12)	0.92	*1.93*** *[0.04]* 0.85 [0.60]	*-9.87* *(6.77)* -0.64 [3.06]	(12,12,12)	0.85	*1.09* *[0.37]* 1.05 [0.41]	*-0.23* *(0.36)* 0.15 (0.17)

+Includes deterministic time trend

	Turnover of Capital Goods											
	Lags(l,m,n)	$\bar{R}^2$	F [p-val]	t (SoC)	Lags(l,m,n)	$\bar{R}^2$	F [p-val]	t (SoC)	Lags(l,m,n)	$\bar{R}^2$	F[p-val]	t (SoC)
Austria	(24,12,12)	0.83	*1.55* *[0.14]* 1.12 [0.37]	*-22.75* *(30.91)* 1.31 (2.48)								
Belgium	(18,12,12)	0.78	*1.02* *[0.43]* 2.38*** [0.01]	*-28.55* *(21.80)* -0.48 (2.52)								
Finland	(18,12,18)	0.72	*1.02* *[0.44]* 0.93 [0.55]	*-95.61*** *(43.63)* -9.62** (5.25)								
France	(24,12,12)	0.61	*0.98* *[0.47]* 0.58 [0.56]	*-21.57** *(11.64)* 0.92 (1.68)								
Germany	(24,12,12)	0.89	*1.54* *[0.12*] 1.78* [0.06]	*20.70* *(25.50)* -17.23** (6.53)								

Notes: 1. The turnover of capital goods series for Portugal is clearly stationary. Hence the log of the this series appears in the regression equation.

	Turnover of Capital Goods											
	Lags(l,m,n)	$\bar{R}^2$	F [p-val]	t (SoC)	Lags(l,m,n)	$\bar{R}^2$	F [p-val]	t (SoC)	Lags(l,m,n)	$\bar{R}^2$	F[p-val]	t (SoC)
Greece	(24,12,12)#	0.58	*1.50* *[0.14]* 1.55 [0.12]	*-61.00**** *(24.59)* 2.06 (2.11)								
Italy	(12,12,12)+	0.65	*2.01*** *[0.03]* 1.59* [0.10]	*-20.16* *(12.94)* 14.45 (9.63)								
Netherlands	(24,12,18)	0.73	*1.17* *[0.31]* 1.15 [0.33]	*-50.06* *(42.22)* 3.75 (7.84)								
Portugal[1]	(12,12,12)	0.36	*0.83* *[0.62]* 1.69* [0.10]	*-10.33* *(8.46)* -8.63 (9.50)								
Spain	(24,12,12)	0.79	*0.76* *[0.69]* 0.91 [0.66]	*-22.27* *(15.54)* 2.17 (9.10)								

A Summary of the Empirical Results Based on Regression Analysis

- **Measures of credit prices appear to carry more relevant information than credit quantities for future economic activity.**
  Past changes in the **spread** are systematically related
  - to changes in Industrial Production and the Unemployment Rate in half of the countries
  - to changes in the Turnover of Capital Goods in the majority of the 10 countries considered
    - predictive ability (F-Test)
    - significant marginal economic effect (t-Test of Sum of Coefficients)

  In contrast, past changes in the **finance mix** variable carry less meaningful information about movements in economic activity. The empirical results suggest that the hypothesized relationship with economic activity is inconsistent with the 'bank lending view' in a few cases (Austria, Finland, Greece, and Germany).

- **Credit spreads can be a useful indicator of changes in some but not all measures of economic activity.**
  Neither the spread nor the ECB spread does a good job of predicting changes in Retail Sales. Spread works for France and the Netherlands and the ECB-spread for Finland and Germany.

- **The performance of the credit spreads is uneven.**
  ECB-spread, despite being highly correlated with the spread, performs worse than the spread as a predictor of changes in the turnover of Capital Goods and Industrial Production.

- **Why is there no evidence of a bank-lending channel à la KSW?**
  - Probably due to the use of aggregate data. It masks the behavior of heterogeneous agents. Firm-level data is more appropriate for a test of the lending view.

  - The mix variable does not necessarily capture the behavior of a firm that has access to bank and open market credit. A firm may *voluntarily* switch from bank credit to issuing bonds simply because bond financing may have become cheaper relative to bank loans.

  - Bank loan commitments may actually lead to an increase in loans outstanding during a downturn as firms draw down their credit lines.

Enter a Credit Spread Based on Bond Yields

- Guender and Tolan (2013) construct bond yield spreads based on individual company data and show that they predict future movements in economic activity (D, E, I, IR, P).
- $GZ_t^a = \frac{1}{n}\sum_j R_{jt}^{Corp} - R_{jt}^{risk-free}$
- Risk-free rate taken from yield curve of German Bunds
- Effect of GZ-spread on economic activity can be estimated only for Germany, Italy, Portugal, and Spain.
- GZ-spread appears to have greater economic significance than other spreads.

Table 8: The Effects of the **GZ-Spread (Bond Yield Spread)** and the Finance Mix on Measures of Economic Activity: **2004:02 -2012:m08**

	Industrial Production				Retail Sales				Unemployment Rate			
	Lags(l,m,n)	$\bar{R}^2$	F [p-val]	t (SoC)	Lags(l,m,n)	$\bar{R}^2$	F [p-val]	t (SoC)	Lags(l,m,n)	$\bar{R}^2$	F[p-val]	t (SoC)
Germany	(12,12,12)	0.95	*3.29*** *[0.01]*	*-23.44*** *(5.79)*	(12,12,12)	0.45	*1.96** *[0.04]*	*-6.06*** *(2.46)*	(12,12,12)	0.65	*0.67 [0.78]*	*0.14 (0.14)*
			1.20 [0.30]	-0.46 (2..23)			0.72 [0.73]	-2.89* (1.57)			0.31 [0.99]	0.01 (0.04)
Italy	(12,12,12)+	0.95	*2.37*** *[0.01]*	*-10.49*** *(3.94)*	(12,12,12)	0.75	*1.08 [0.39]*	*-1.99 (1.26)*	(12,12,12)	0.21	*1.89** *[0.05]*	*0.42** *(0.19)*
			0.87 [0.57]	0.51 (4.01)			0.78 [0.67]	1.93 (1.75)			1.01 [0.44]	-0.37 (0.27)
Portugal	(12,12,12)	0.61	*2.27** *[0.02]*	*-36.52*** *(9.82)*	(12,12,12)	0.75	*0.95 [0.51]*	*-11.14** *(5.60)*	(12,12,12)	0.21	*1.14 [0.34]*	*0.54 (0.60)*
			1.18 [0.32]	-2.91 (4.12)			1.03 [0.43]	*4.06 (2.98)*			1.51 [0.14]	0.12 (0.21)
Spain	(12,12,12)	0.93	*1.53 [0.14]*	*-6.75* (3.57)*	(12,12,12)	0.93	*1.96** *[0.04]*	*-5.48*** *(1.73)*	(12,12,12)	0.82	*0.94 [0.51]*	*0.04 (0.17)*
			0.81 [0.64]	1.46 (3.17)			2.52*** [0.01]	44.20*** (9.01)			0.85 [0.60]	-1.22 (0.88)

	Turnover of Capital Goods											
	Lags(l,m,n)	$\bar{R}^2$	F [p-val]	t (SoC)	Lags(l,m,n)	$\bar{R}^2$	F [p-val]	t (SoC)	Lags(l,m,n)	$\bar{R}^2$	F[p-val]	t (SoC)
Germany	(12,12,12)	0.90	*3.16*** *[0.01]* 0.73 [0.71]	*-42.62*** *(11.87)* -3.30 (4.56)								
Italy	(12,12,12)+	0.95	*3.33*** *[0.01]* 2.35*** [0.01]	*-52.67*** *(11.25)* 45.10*** (13.64)								
Portugal	(12,12,12)	0.41	*0.85 [0.60]* 1.45 [0.16]	*-4.28 (23.30)* -10.02 (19.66)								
Spain	(12,12,12)	0.78	*1.27 [0.25]* 0.32 [0.98]	*-23.29** (10.74)* 15.38 (33.84)								

- **Germany** and **Italy** provide strongest evidence of important role of changes in the composition of credit and relative cost of credit.
- **Industrial Production** and **Capital Spending** seem to be particularly sensitive to changes in the GZ-spread.

Conclusion

- **Adrian, Colla and Shin (2013)** argue that credit prices should provide better information about future aggregate economic activity than credit quantities.
- **This project** examines this hypothesis in 10 member states of the Euro area.
- **The composition of external finance** has changed markedly in some countries over the sample period.
- **Credit spreads are higher now than in 2003,** particularly on the **Southern flank.**
- **There is some evidence that credit spreads** provide a more reliable signal about future economic activity than the composition of external finance.
- There is little evidence for the presumed link between **the composition of external finance -** envisaged by the 'bank lending view' as signaling loan **supply constraints –** and **economic activity**.
- **The evidence in favor of credit spreads is spotty though**
  - **Uneven** (GZ-spread, spread, ECB-spread)
  - **Dependent upon measure of economic activity**

What Lies Ahead

1. Test for asymmetric effects. Are increases in credit spreads more damaging for economic activity than the benign effects of decreases in the spread?
2. Does maturity matter, i.e. changes in the relative supplies of short-term and long-term credit?