

The European sovereign debt crisis and the role of rating agencies

Manfred Gärtner

Department of Economics, School of Economics and Political Science
University of St. Gallen, Switzerland

manfred.gaertner@unisg.ch

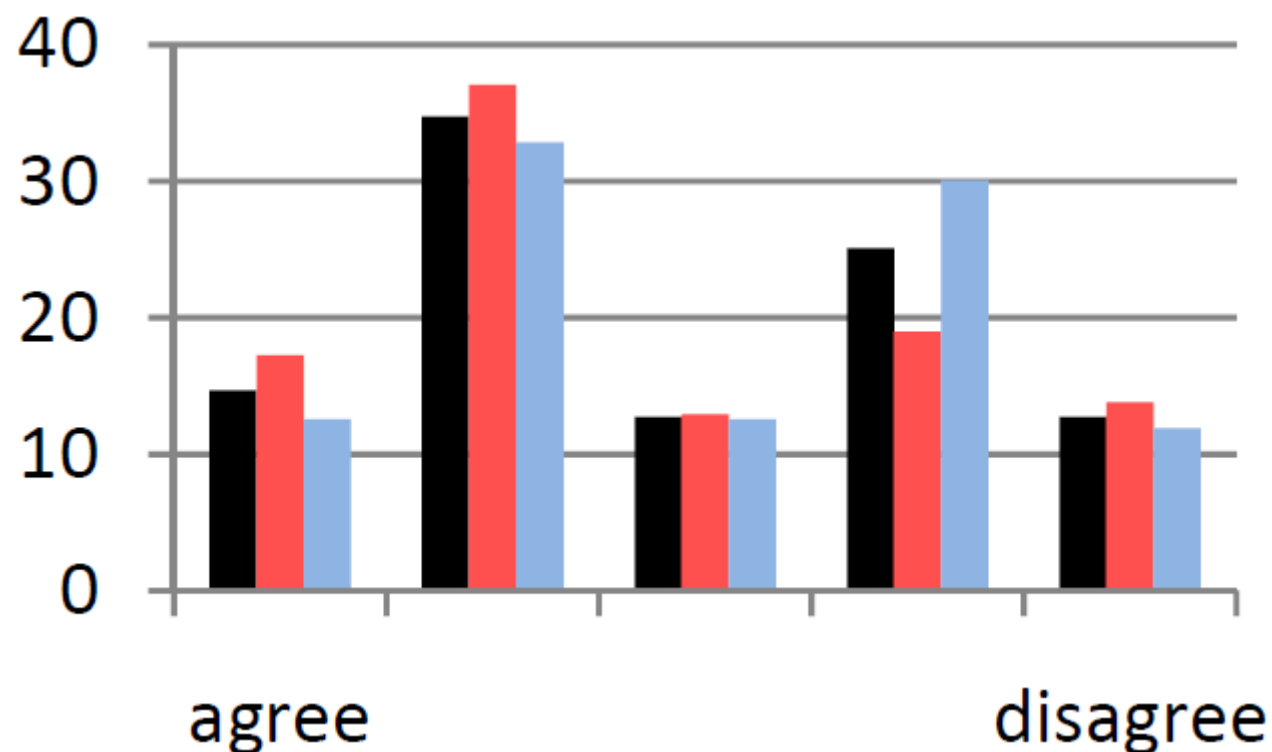
A look into the rear view mirror: a 2010 survey

A quick look at opinions and perceptions in 2010 may put the 'European debt crisis' in perspective, which erupted full force soon after.

Here are some results from an online survey conducted among more than 700 undergraduate macroeconomics instructors at universities and colleges in Europe and the United States towards the end of 2010.

2010 Survey

When Lehman Brothers collapsed, the Western World was close to a complete economic breakdown.



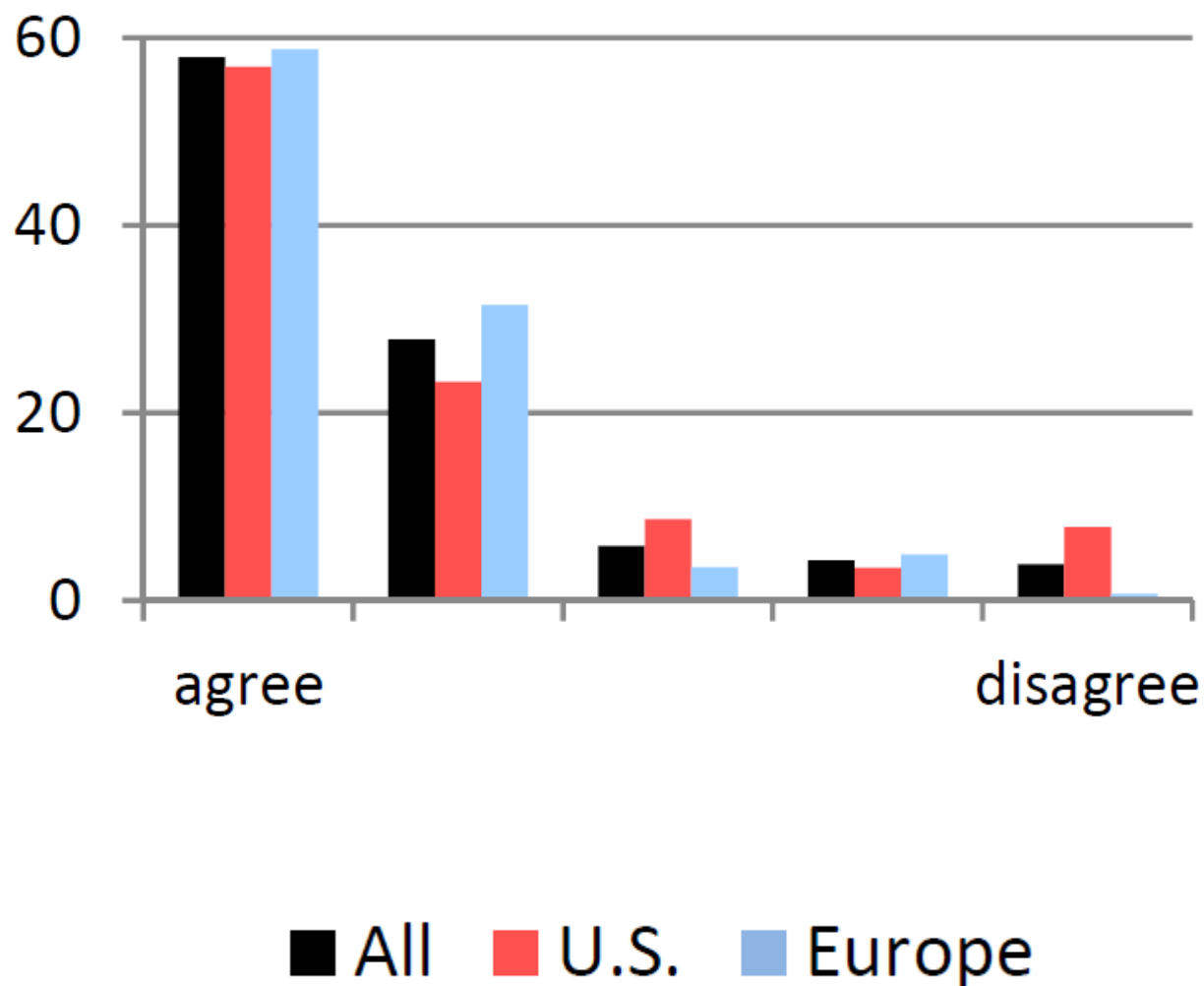
Source:

Gärtner, Griesbach and Jung (2011).
Teaching Macroeconomics after the Crisis: A Survey among Undergraduate Instructors in Europe and the U.S., Economics Working Paper Series 1120, University of St. Gallen, School of Economics and Political Science.

■ All ■ U.S. ■ Europe

2010 Survey

Financial markets need tighter regulation in order to reduce the risk of future financial crises

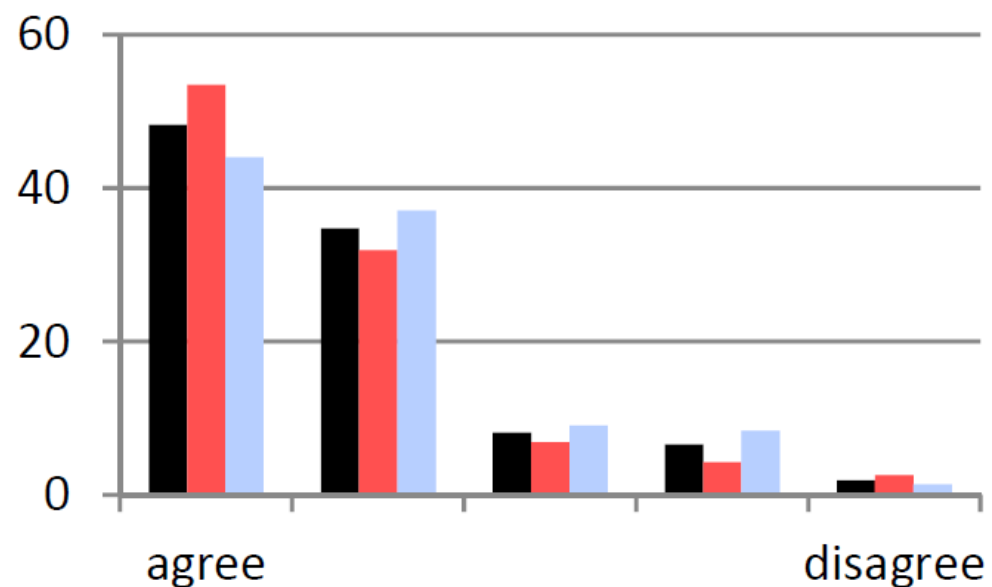
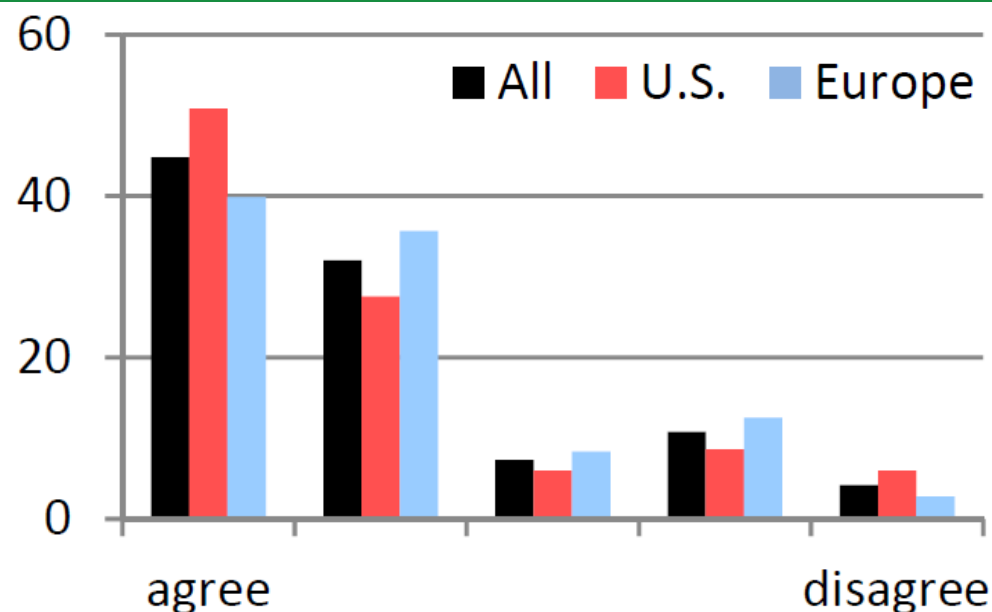


Source:
Gärtner, Griesbach and Jung (2011)

2010 Survey

Fiscal policy is an essential tool to mitigate economic downturns

Monetary policy is an essential tool to mitigate economic downturns



Source:
Gärtner, Griesbach and Jung (2011)

Background

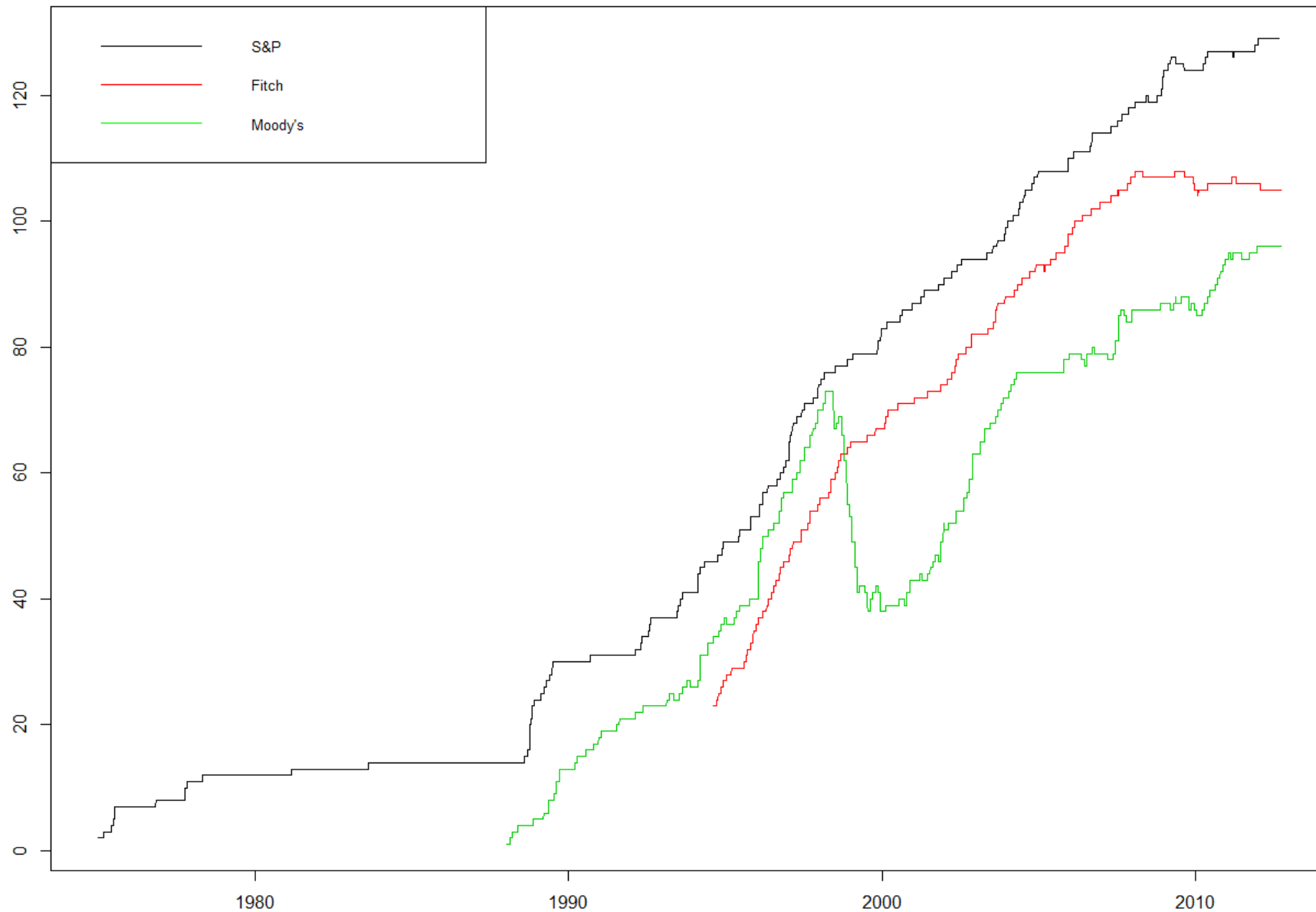
Presentation draws on three recent papers:

- Gärtner, M., B. Griesbach and F. Jung (2011). PIGS or Lambs? The European Sovereign Debt Crisis and the Role of Rating Agencies. *International Advances in Economic Research* 17(3), August.
- Gärtner, M. and B. Griesbach (2012). Rating agencies, self-fulfilling prophecy and multiple equilibria? An empirical model of the European sovereign debt crisis 2009-2011. *Economics Working Paper Series* 1215, University of St. Gallen, School of Economics and Political Science.
- Gärtner, M., B. Griesbach and G. Mennillo (2013). The near-death experience of the Celtic Tiger: A model-driven narrative from the European sovereign debt crisis. *Intereconomics – Review of European Economic Policy* 48(6), November-December (forthcoming).
Working paper version available at <http://ideas.repec.org/p/usg/econwp/201321.html>

Outline

1. The government bonds market: Romer's model
2. Enter rating agencies: extensions and empirical estimates
3. Triggers and drivers of the European 'sovereign debt crisis'
Case study: Ireland's odyssee 2007 – 2011
4. Conclusions

Number of countries with credit rating



The government bonds market: Romer's model

The government bonds market: Romer's model

Equation 1

Expected payoff from holding government debt must equal the risk-free payoff:

$$(1 - p)(1 + i) = (1 + i^*)$$

$$p = \frac{i - i^*}{1 + i}$$

p : probability of default

i : interest rate

i^* : risk-free interest rate

D : quantity of debt coming due

Equation 2

A government defaults when its ability to pay drops below a given threshold:

$$p = F(i, D) \quad F_i, F_D > 0$$

Source: Romer (2011).
Advanced Macroeconomics. 4th ed.

The two-equations Romer model

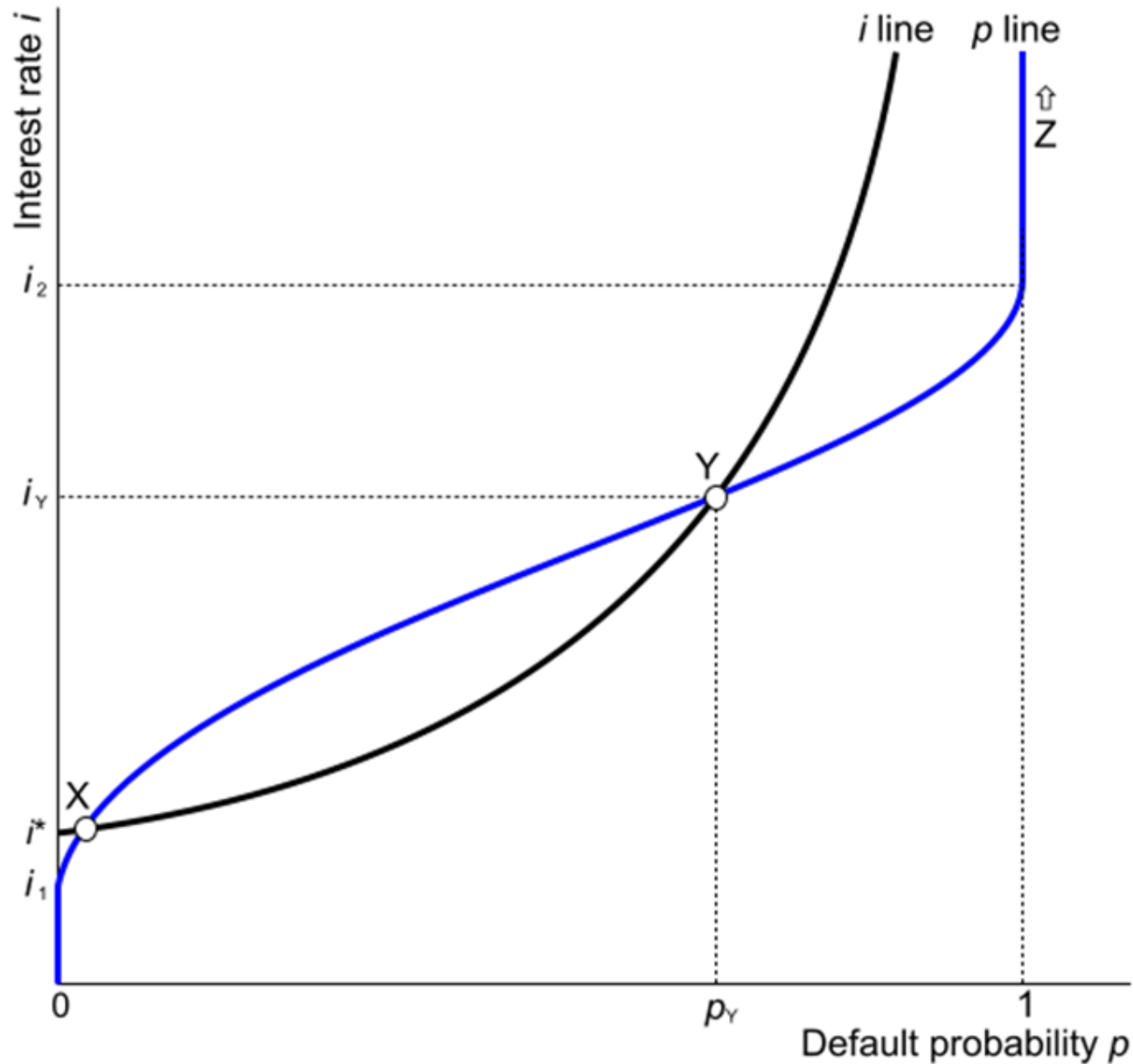


Figure 1. The Romer model of sovereign debt crises

Source: Romer (2011).
Advanced Macroeconomics. 4th ed.

The two-equations Romer model

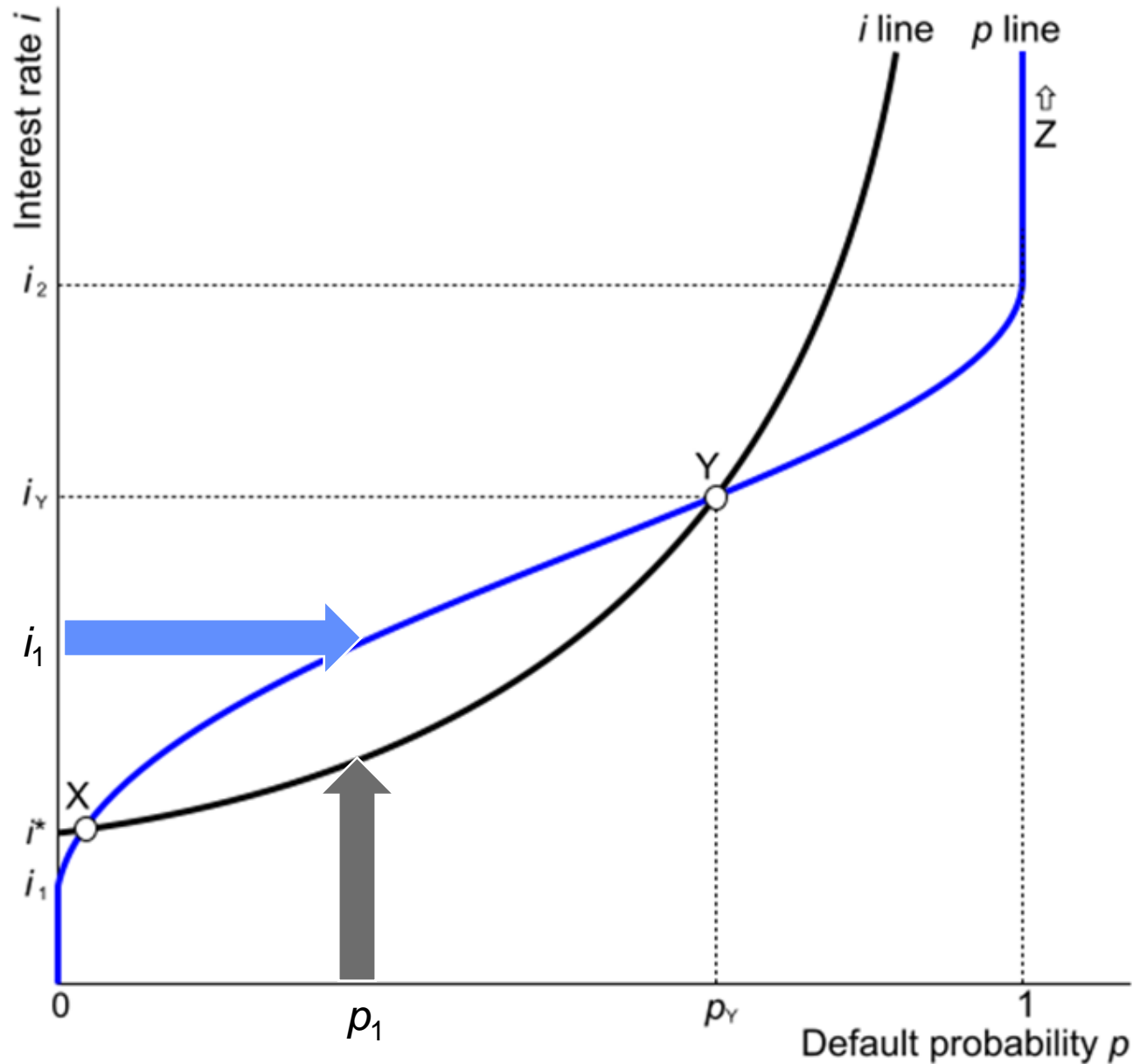


Figure 1. The Romer model of sovereign debt crises

Source: Romer (2011).
Advanced Macroeconomics. 4th ed.

The two-equations Romer model

Multiple equilibria

And

self-fulfilling prophecy

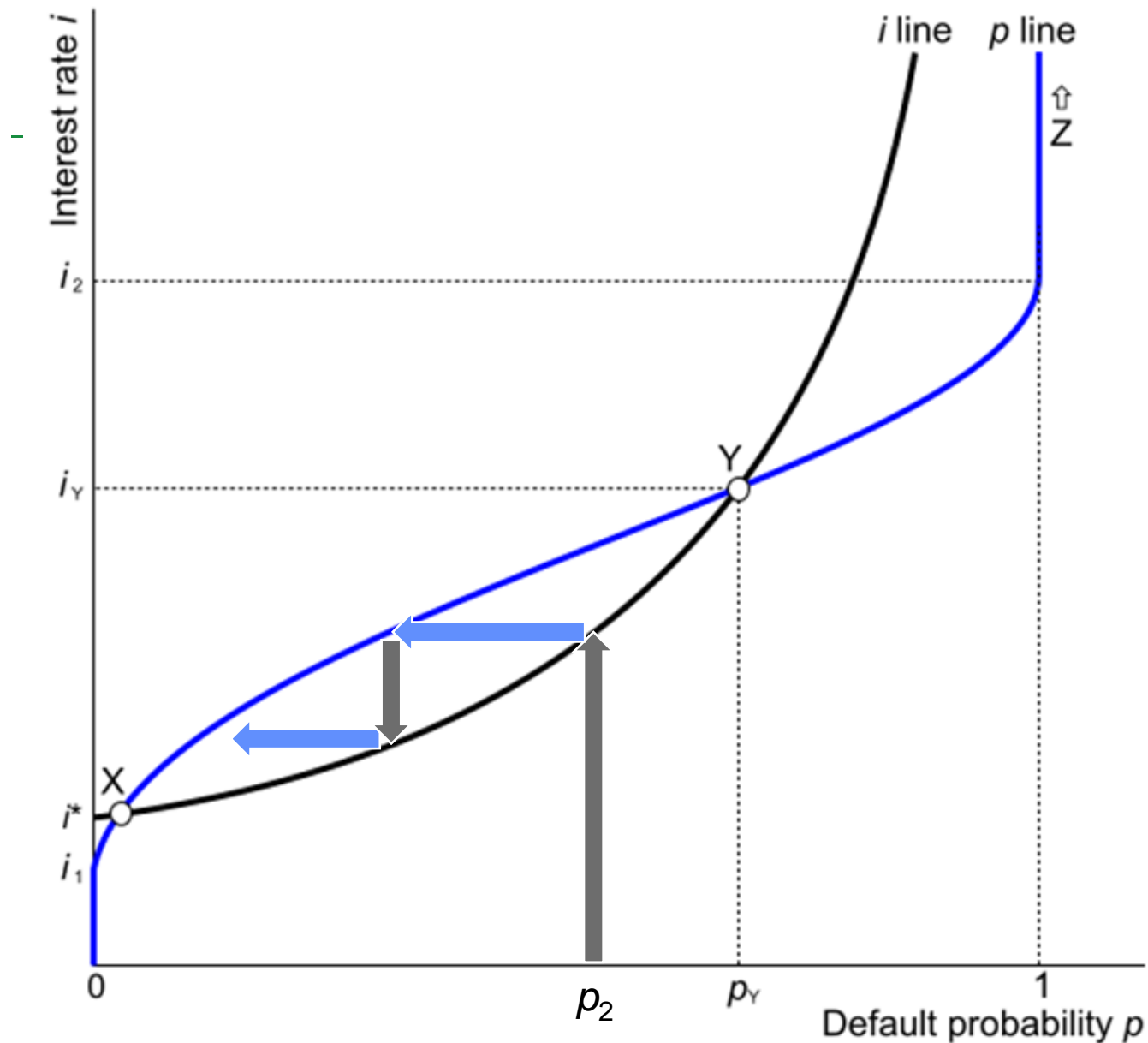


Figure 1. The Romer model of sovereign debt crises

Source: Romer (2011).
Advanced Macroeconomics. 4th ed.

The two-equations Romer model

Multiple equilibria

and

self-fulfilling prophecy

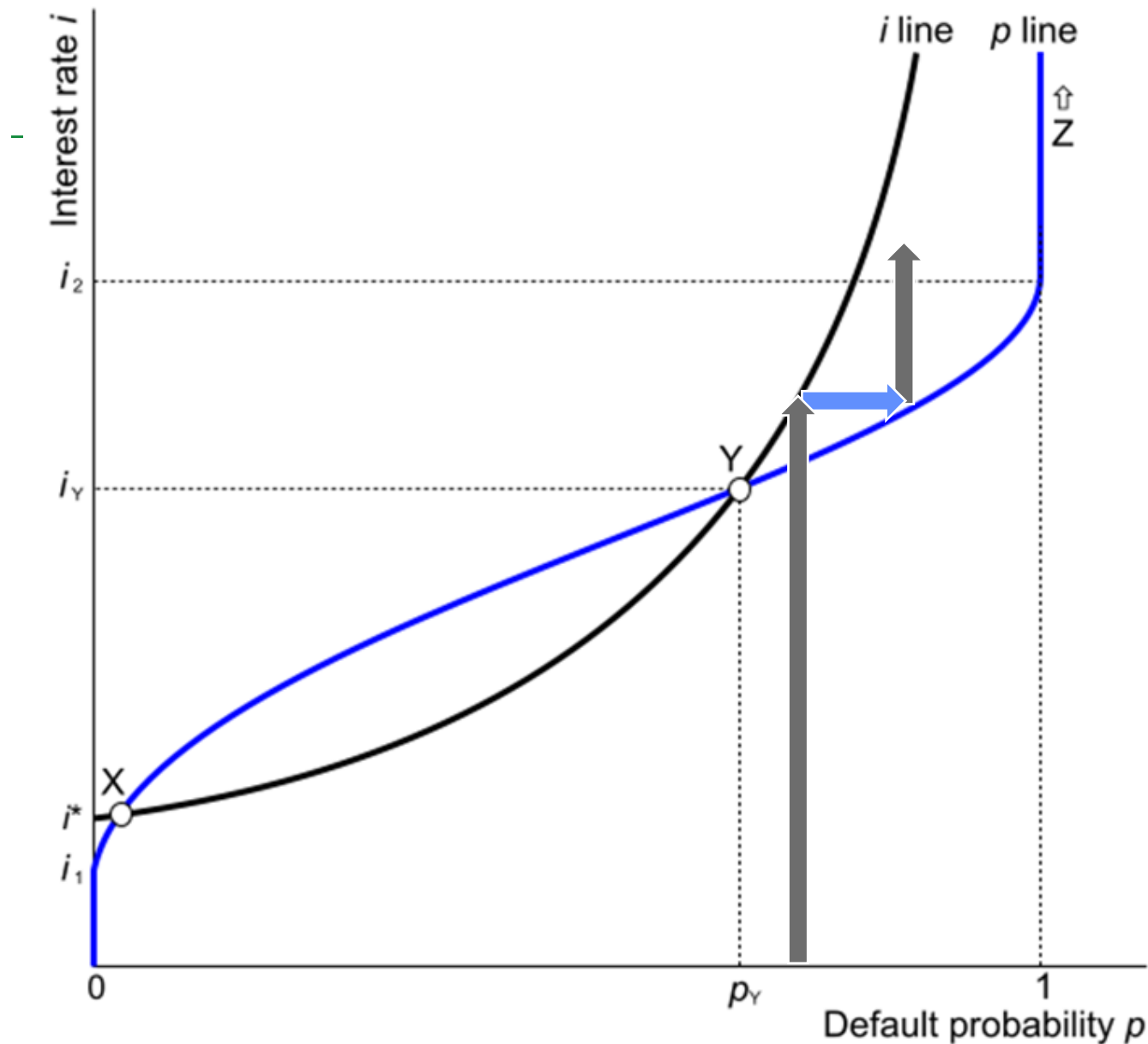


Figure 1. The Romer model of sovereign debt crises

Source: Romer (2011).
Advanced Macroeconomics. 4th ed.

The two-equations Romer model

Multiple equilibria

and

self-fulfilling prophecy

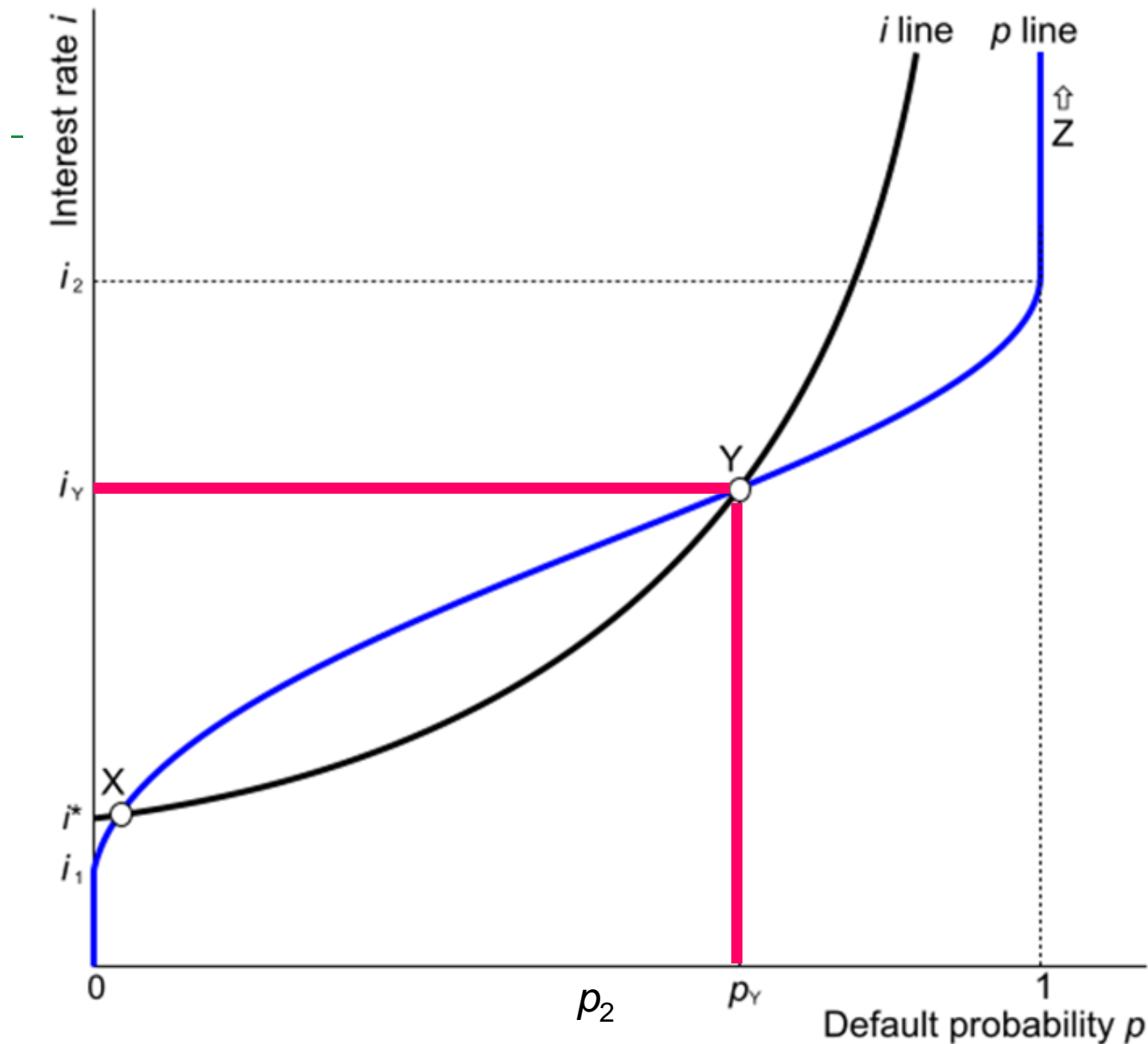


Figure 1. The Romer model of sovereign debt crises

Source: Romer (2011).
Advanced Macroeconomics. 4th ed.

The two-equations Romer model

Multiple equilibria

and

self-fulfilling prophecy

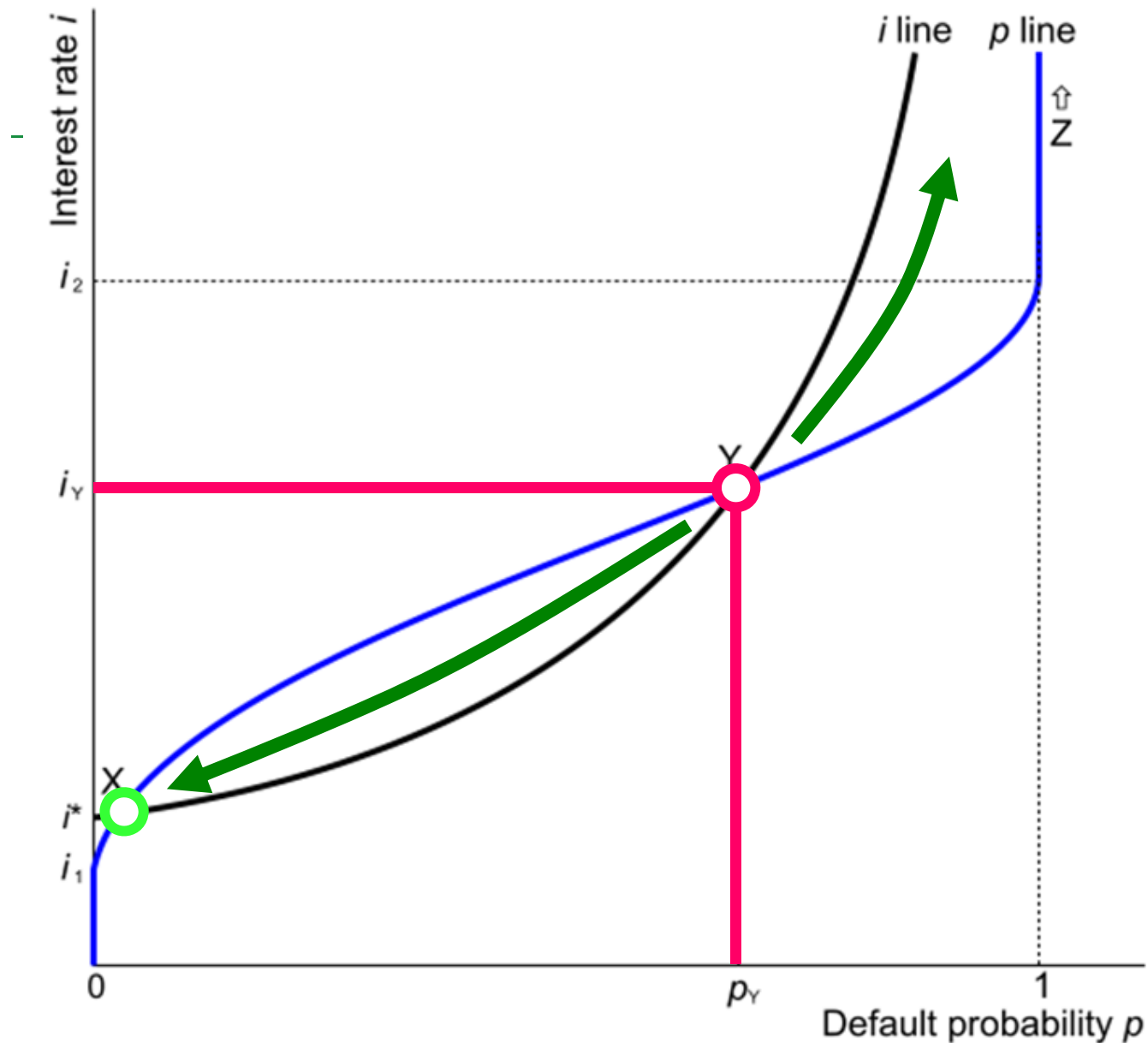


Figure 1. The Romer model of sovereign debt crises

Source: Romer (2011).
Advanced Macroeconomics. 4th ed.

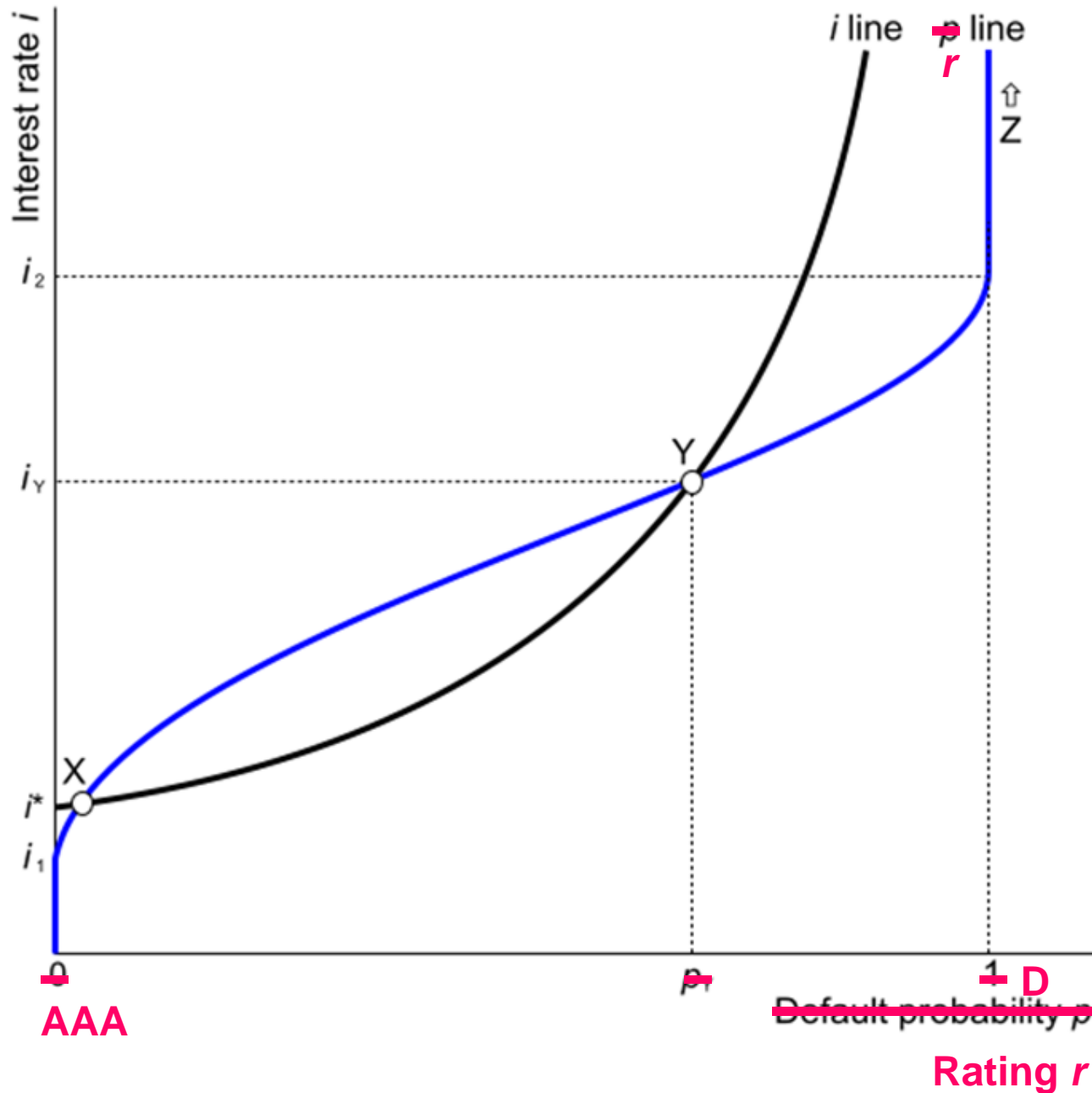
Enter rating agencies

Enter rating agencies

Assumptions:

Sovereign debt ratings are indicators of default risk

Investors use ratings as indicators of default risk



Enter rating agencies

Interest rate equation

$$(1.1) \quad i = \Omega(r) \quad \Omega_r > 0$$

i : interest rate
 r : sovereign debt rating
 i^{eff} : effective interest rate
 \mathbf{F} : vector of other variables

Rating equation

$$(2.1) \quad r = \Pi(i^{\text{eff}}, \mathbf{F}) = \Pi\left[\left(\sum_{j=0}^m \alpha_j i_{-j}\right), \mathbf{F}\right]$$

$$\Pi_i > 0$$

From three sources

(1) **Theory**

$$\text{Debt}(+1) = \text{Debt} + \text{Primary deficit} + (i - \text{Inflation} - \text{Growth})\text{Debt}$$

Debt and deficits as ratios

(2) **Empirical research** on the determinants of government bond yields, such as

Afonso, Furceri and Gomes (2012)

De Grauwe and Ji (2012)

Ferri, Liu and Stiglitz (1999)

(3) **Rating agencies**

Rating conversion

Fitch
Rating Numerical
 value

AAA	1
AA+	2
AA	3
AA-	4
A+	5
A	6
A-	7
BBB+	8
BBB	9
BBB-	10
BB+	11
BB	12
BB-	13
B+	14
B	15
B-	16
CCC+	17
CCC	18
CCC-	19
CC	20
C	20
RD	21
DDD	21
DD	21
D	21

Government bonds market

Enter rating agencies

Case: Ireland's odyssey

Conclusions

Descriptive statistics

	Mean	Median	Std. Dev.	Maximum	Minimum
Rating	2.7	1	2.5	18	1
GDP growth	2.2	2.3	1.9	9	-4.3
GDP per capita	30.9	30.5	8.1	53.4	11.1
Budget surplus	-1.7	-2	5.3	19.1	-31.3
Primary surplus	-0.4	-0.1	3	6.9	-8.2
Debt ratio	68.2	61.1	34.4	211.7	13.7
Inflation	2.3	2.3	1.5	9.8	-1.7
Bond yield	4.6	4.4	1.7	19.1	1
Credit spread	0.8	0.3	2.5	33.1	-3.6

The rating equation

Endogenous variable: sovereign debt rating r .
 Annual data for 25 OECD countries, 1999-2011.

	OLS	2SLS
Constant	1.214 (2.408)	1.432 (0.944)
GDP growth	-0.049 (0.105)	0.110* (0.066)
GDP per capita	-0.118*** (0.037)	-0.116*** (0.015)
Budget surplus	-0.013 (0.053)	0.007 (0.021)
Debt ratio	0.022*** (0.008)	0.015*** (0.003)
Primary surplus	-0.141** (0.070)	-0.232*** (0.033)
Inflation	0.178* (0.105)	0.053 (0.078)
\bar{i}_{-1}	0.693*** (0.219)	
i		0.742*** (0.110)
R^2	0.608	0.686
Adjusted R^2	0.598	0.678
Observations	291	291

The interest rate equation

Endogenous variable: credit spread of government bond yields versus Germany $i - i_D$.

Annual data for 25 OECD countries, 1999-2011.

	OLS	OLS	2SLS
Constant	-0.961** (0.482)	0.228** (0.100)	0.164** (0.083)
r	0.657*** (0.213)		
r^3		0.006*** (0.000)	0.007*** (0.000)
R^2	0.420	0.799	0.768
Adjusted R^2	0.418	0.798	0.767
Observations	291	291	291

Statistical issues

Robustness checks

- Panel estimates with country fixed effects
- Heteroscedasticity and autocorrelation robust standard errors
- Generalized additive model
- Segmented regressions
- Ordered regressions
- First differences
- Only eurozone countries
- Cross section for 2005, 2010 or 2011

Estimated rating and interest rate lines

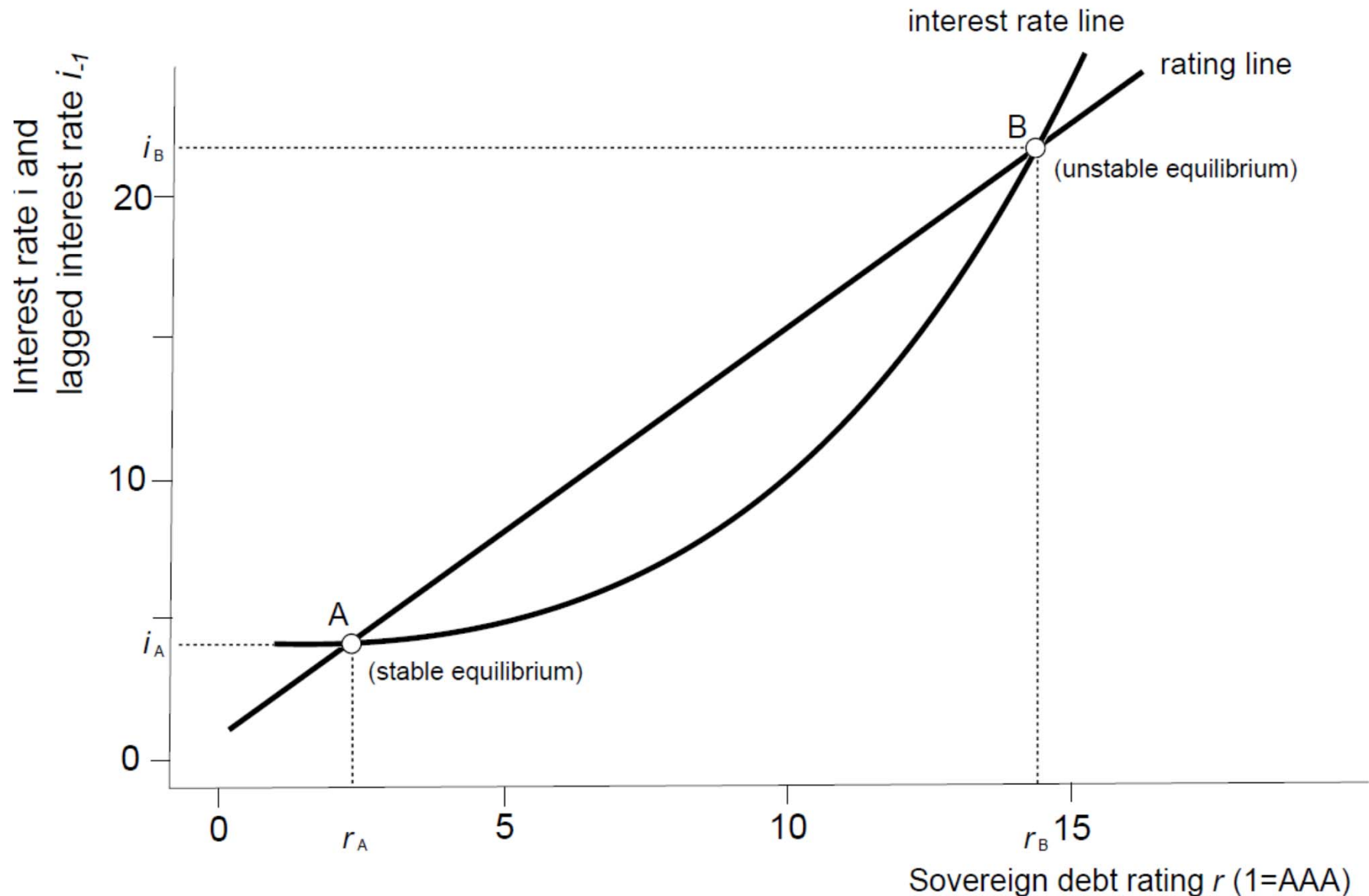
Positioned using sample averages of exogenous variables

Government bonds market

Enter rating agencies

Case: Ireland's odyssey

Conclusions



Empirical results

1. **Interest rate equation**, including convexity property, quantifying the effect of ratings on spreads, is **extremely robust**.

2. **Rating equation is also robust**, but less than interest rate equation.

Significance of coefficients is affected in a few instances

Occasional sign change (mostly regarding income growth)

BUT: Coefficient on (current or lagged) interest rate very robust

3. There is a strong nonlinear effect of ratings on interest rates that *may* give rise to **multiple equilibria** and **self-fulfilling prophecy**. The 'good' equilibrium is stable. A second equilibrium looms which is unstable. Beyond this *insolvency threshold* even countries with *healthy* fundamentals could be drawn towards default.

Individual countries must be evaluated with their own fundamentals

Case study: Ireland's odyssey 2007-2011

The quality of sovereign debt ratings

If the market for sovereign bonds may feature multiple equilibria and be vulnerable to self-fulfilling prophecy, the quality of ratings becomes essential.

In principle, there appear to be **three basic ways** to evaluate ratings:

■ **Look at their predictive success**

- conceptual problem because of self-fulfilling prophecy
- no data on sovereign defaults

■ **Look at the expertise of the people who create the ratings**

- very weak criterion because conflicts of interest still loom
- academic credentials not really impressive [see Gaillard (2012)]

■ **Look at the consistency of ratings over time and between countries**

- this is the approach taken here

«It is important, though, that investors realise the **limitations of this [sovereign debt rating] exercise**, which is necessarily far less certain than our ability to analyse either bank or corporate risks of default. **The essential problem is that the world of sovereign borrowers is far smaller than the world of large banks or corporations, and that the number of instances of default in the modern period when we have reasonable national accounts is tinier still.** ... So the rating of sovereigns depends more on the art of political economy than on the science of econometrics.»

Fitch Ratings: Sovereign Ratings, Rating Methodology, 2002, S. 3 f.

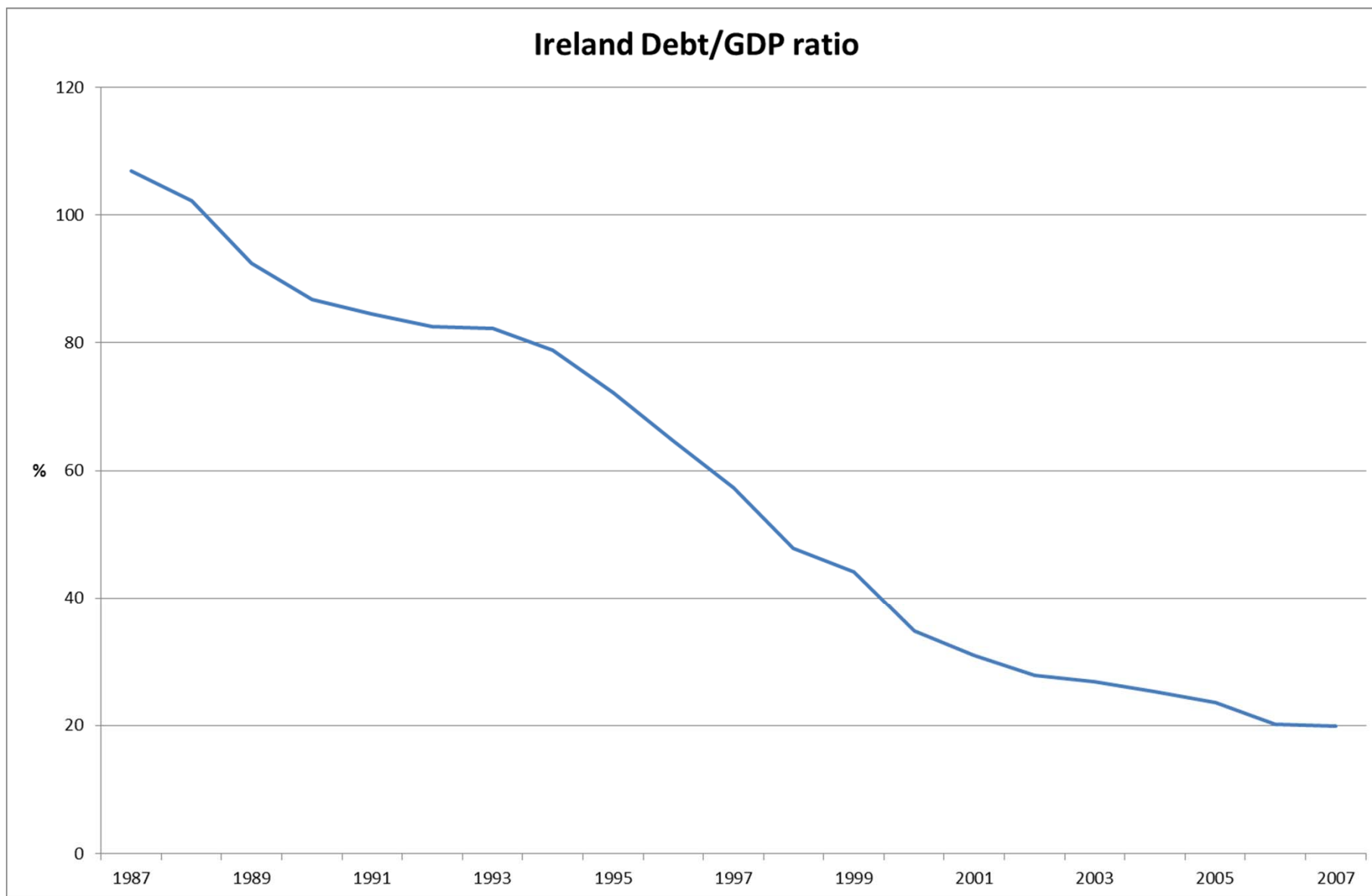
Staatsanleihen zu bewerten liege sowieso ausserhalb des traditionellen Kompetenzgebiets der Ratingagenturen. «Da geht es um Politiker, es geht um Abgeordnete, es geht nicht um das Kreditrisiko. Ich verstehe nicht, wie eine Ratinggesellschaft ein besseres Verständnis dafür haben soll als sie oder ich oder irgendjemand anders. Ratings sind nicht das heilige Werk Gottes.»

David Jacob, früher Standard & Poor's, zitiert in *Unternehmer*, 1/2012, S. 46.

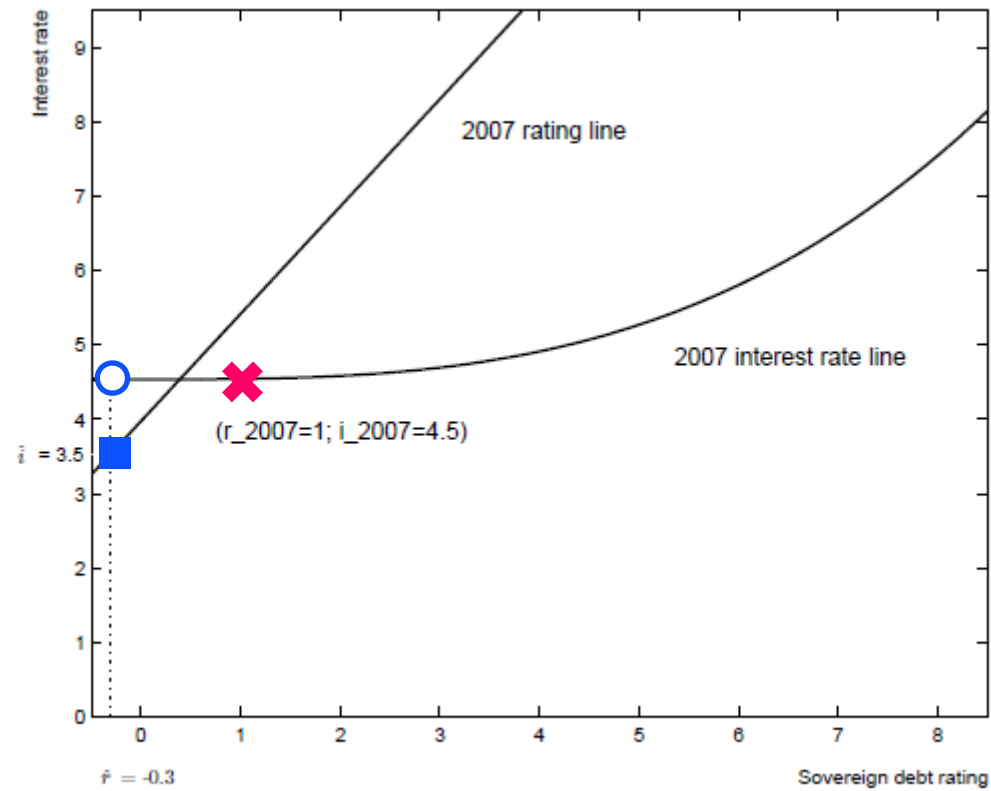
«Darüber hinaus gibt es die Meinung, dass wir für die Richtigkeit unserer Ratings haftbar sein sollen. Das kann nicht sein. ... Wir können nicht dafür haftbar gemacht werden, ob etwas, das wir heute annehmen, in drei Jahren auch so passieren wird oder nicht. **Dann wüssten wir auch die Lotto-Zahlen.»**

Torsten Hinrichs, Standard & Poor's, *Der Standard*, 16. Januar 2012.

Case study: Ireland's odyssey 2007-2011

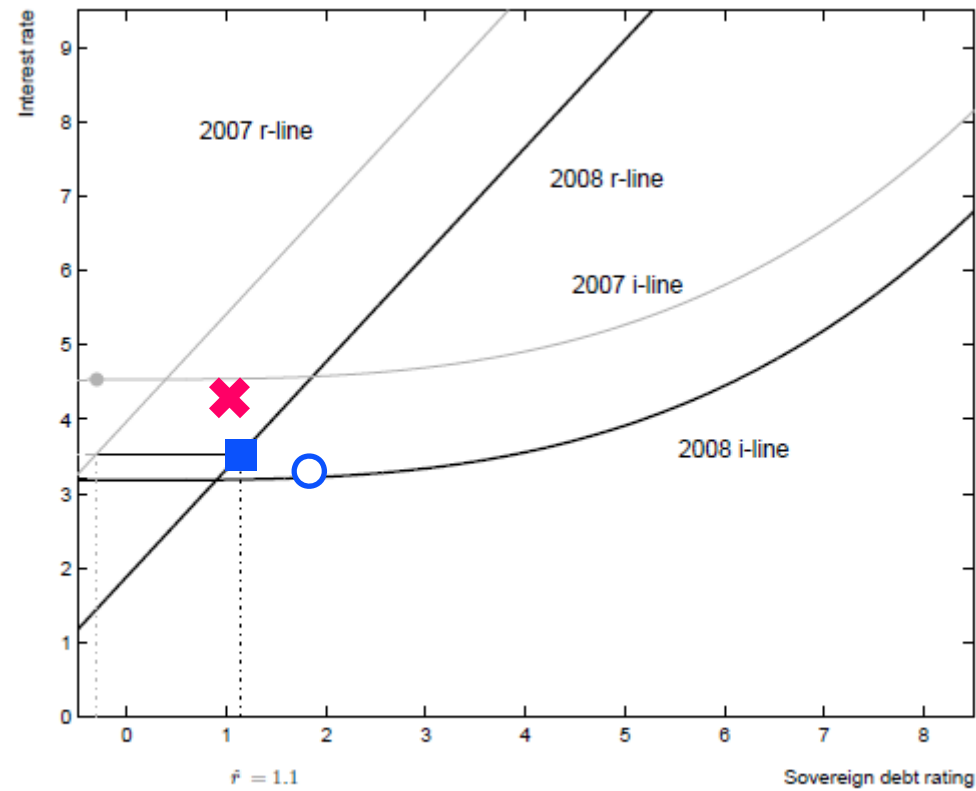


Ireland in 2007

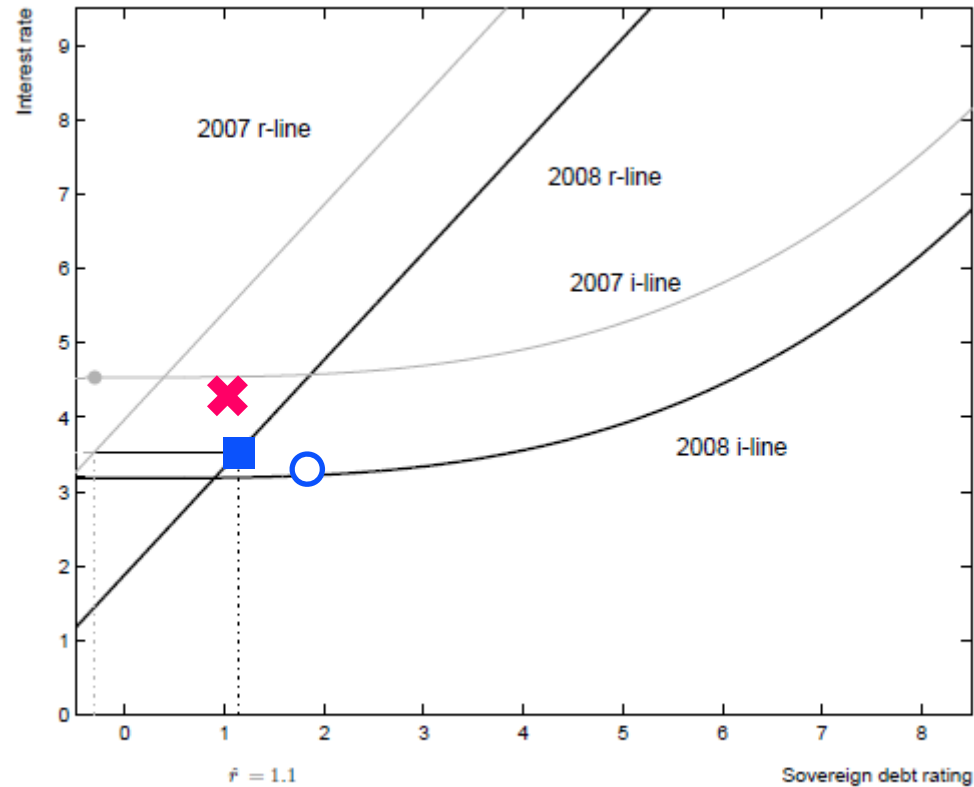


Ireland in 2008

Government bonds market
Enter rating agencies
Case: Ireland's odyssey
Conclusions



Ireland in 2008



Main contributors to shift of *r* line by 1.4 notches

Erosion of government finances	65%, of which 50% due to higher primary deficit which increased to 6% 50% due to leap in debt ratio from 29 to 50%
Other fundamentals	less than 10% each

Ireland in 2008

Details:

Tax revenue fell by	€ 6.4 bn
Social welfare spending increased by	€ 2.9 bn
Net capital outlays and other items	€ 3.7 bn
Total deficit	€13 bn [7.3% of GDP(= €180 bn)]

Then why did debt ratio increase so much?

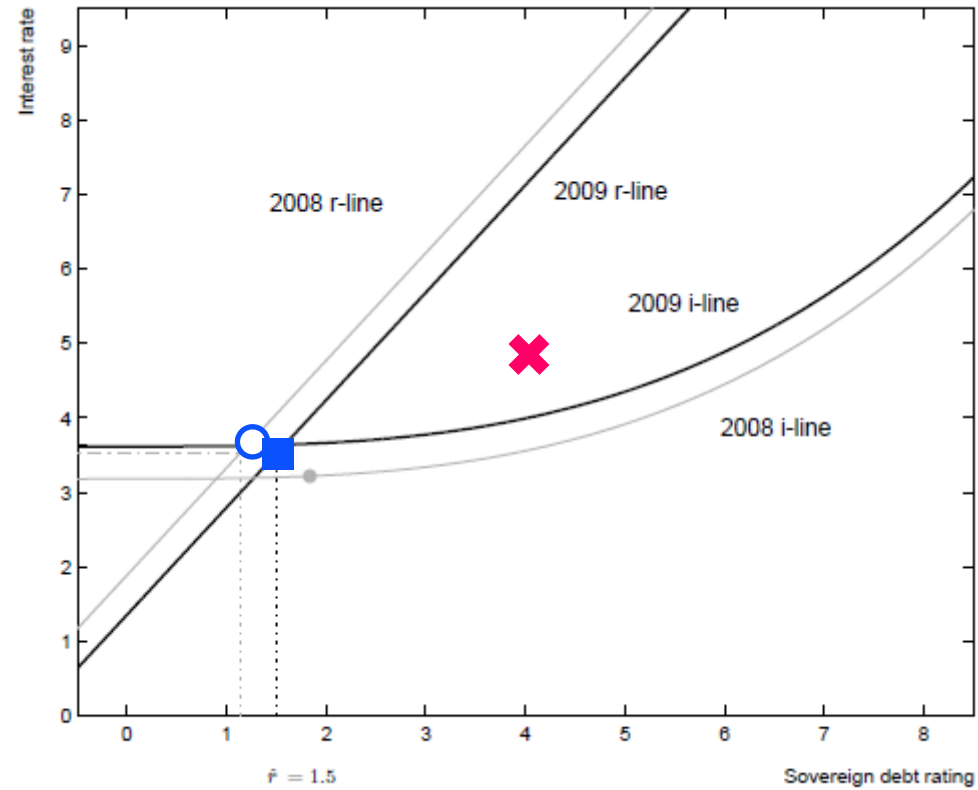
Government issued new debt titles in excess of €20 bn to fill war chest to back its €440 bn **guarantee of Irish banks' liabilities**.

It did **NOT** use any of this in 2008. So: no affect on budget, but it added to debt.

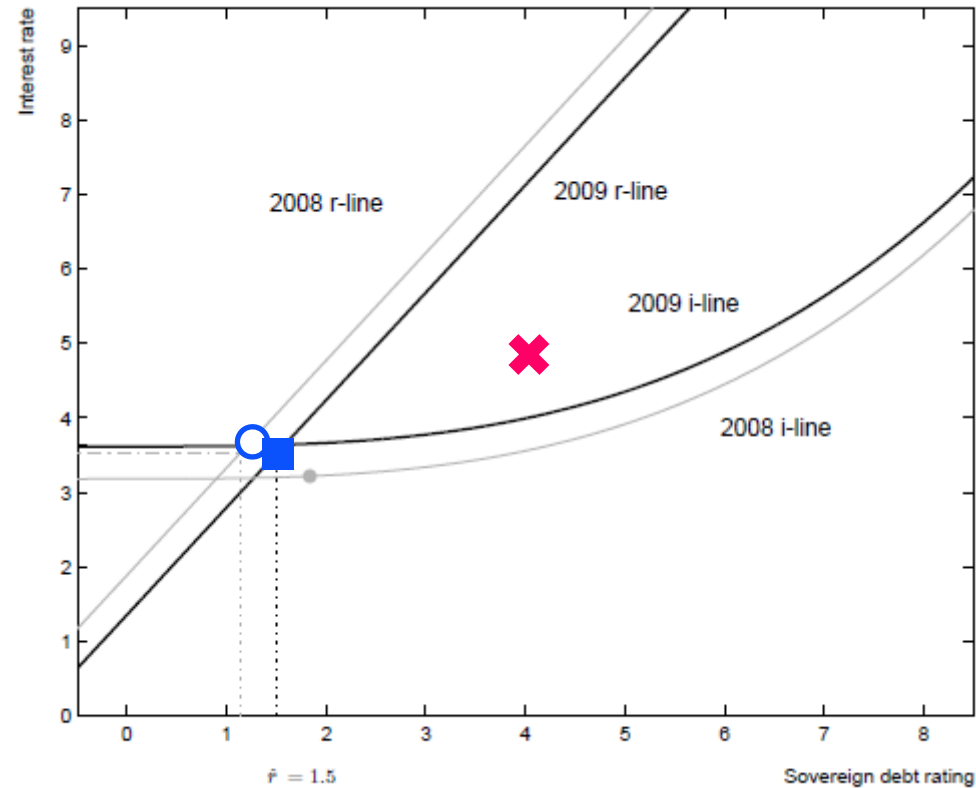
Main contributors to shift of <i>r</i> line by 1.4 notches	
Erosion of government finances	65%, of which 50% due to higher primary deficit which increased to 6% 50% due to leap in debt ratio from 29 to 50%
Other fundamentals	less than 10% each

Ireland in 2009

Government bonds market
Enter rating agencies
Case: Ireland's odyssey
Conclusions



Ireland in 2009



Main contributors to shift of *r* line by less than half a notch

Jump in debt ratio	40%; Debt ratio jumped from 50 to 65%
Drop in income level	30%; income plunged by another 7%

Ireland in 2009

Details:

Tax revenue fell by another	€ 7.5 bn
Social welfare spending, net capital	
Outlays, bank rescues and other items	€ 8 bn
2008 deficit	€13 bn
Total deficit	€28.5 bn [13.9% of GDP]

Rating action kicked in early:

Standard & Poor's

9 January 2009: negative outlook

30 March 2009: downgrade to AA+

Fitch

6 March 2009: negative watch («because of a slump in tax revenue»)

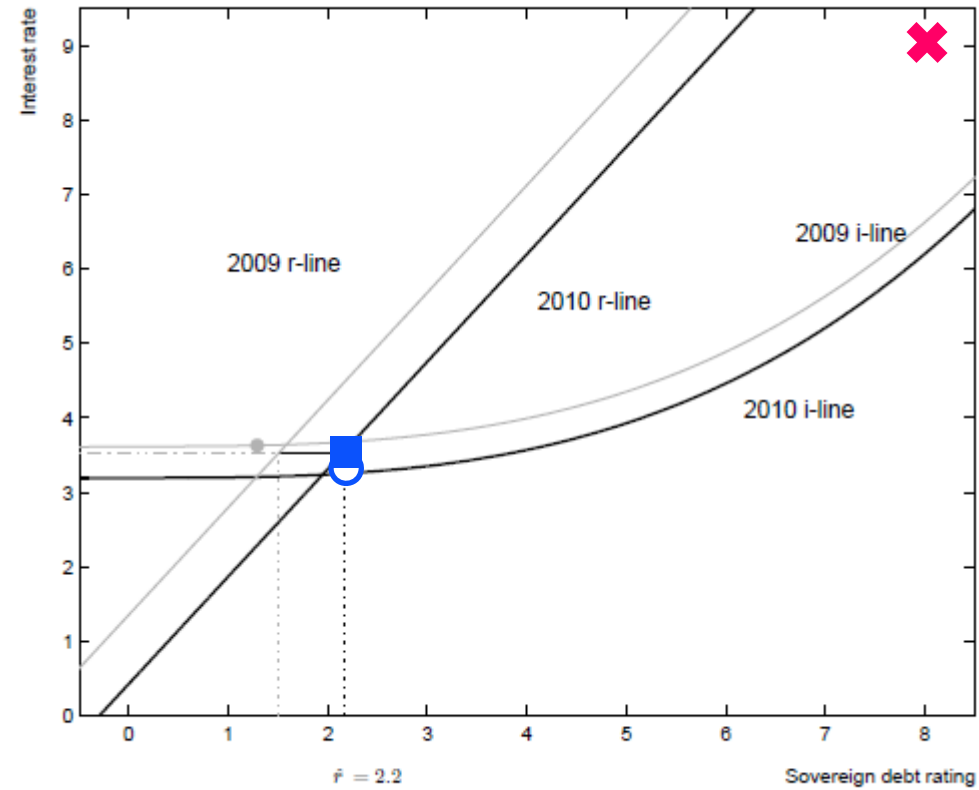
April 2009: downgrade to AA+

Main contributors to shift of *r* line by less than half a notch

Jump in debt ratio	40%; Debt ratio jumped from 50 to 65%
Drop in income level	30%; income plunged by another 7%

Ireland in 2010

Government bonds market
Enter rating agencies
Case: Ireland's odyssey
Conclusions

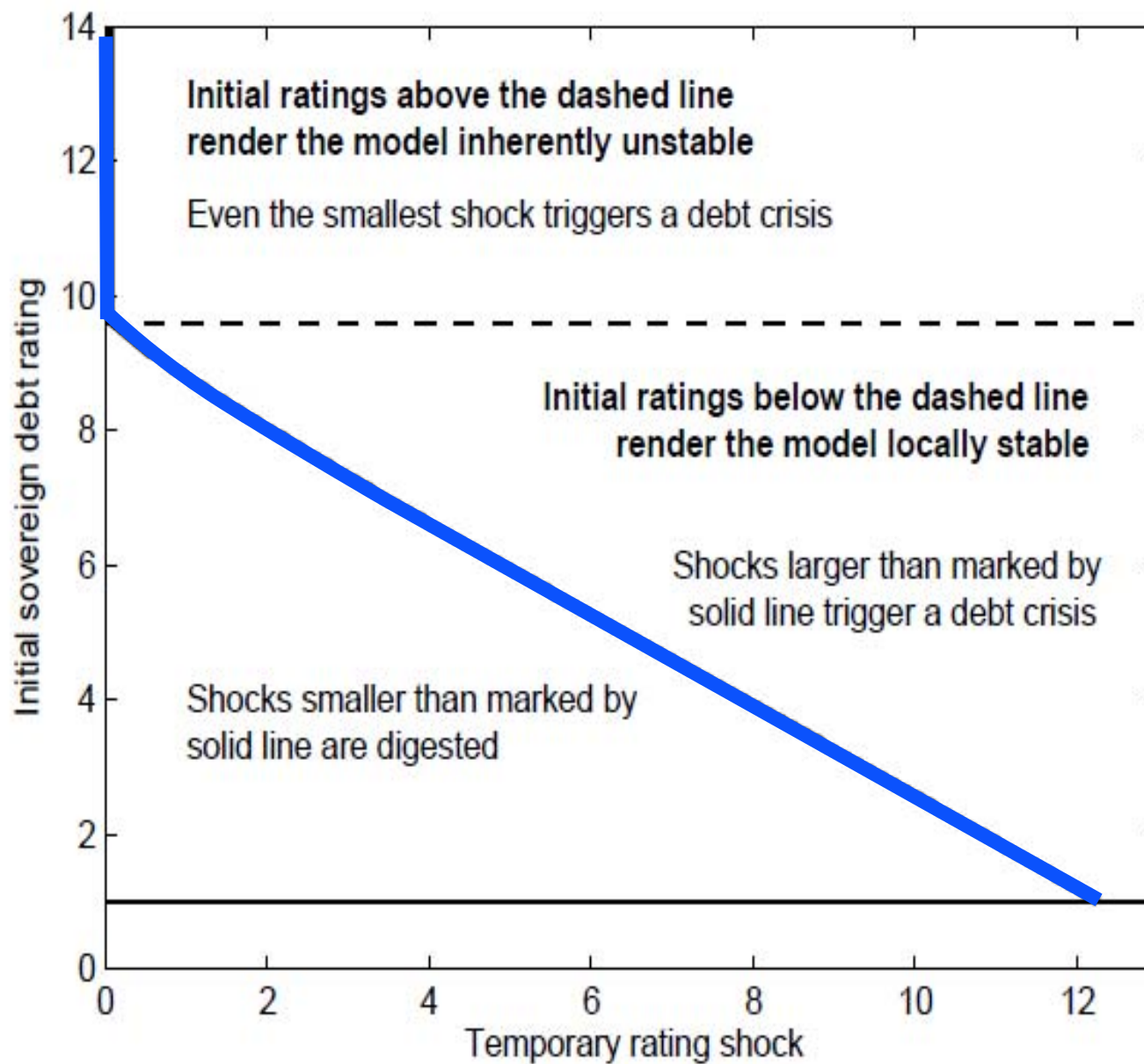


Refining the interest rate equation

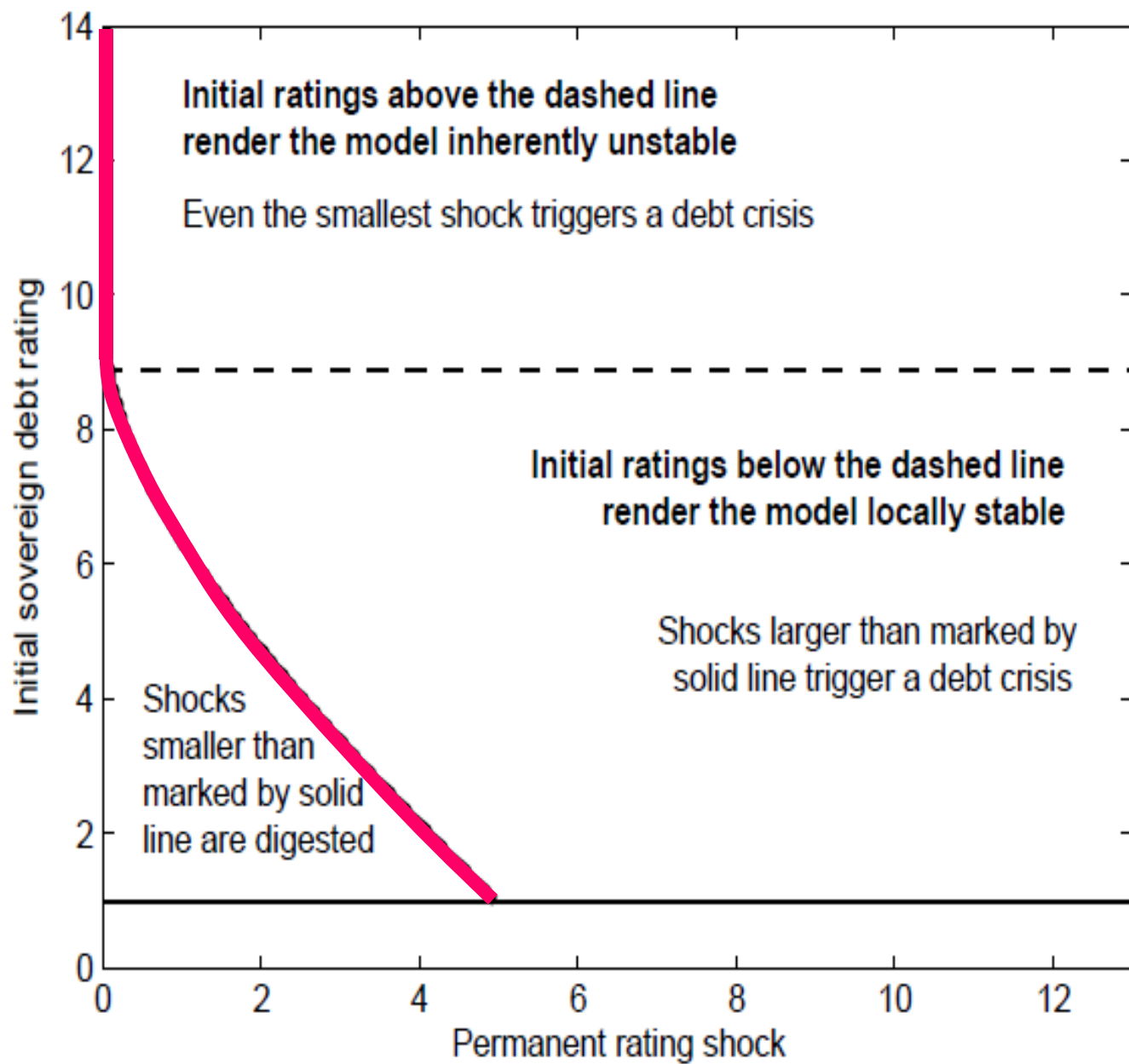
Endogenous variable: credit spread of government bond yields versus Germany
 $i - i_D$.

Annual data for 25 OECD countries, 1999-2011.

	(4)	(5)	(6)
Constant	0.228** (0.100)	0.265** (0.105)	0.223** (0.104)
r^3	0.006*** (0.000)	0.005*** (0.000)	0.005*** (0.000)
Δr		0.504*** (0.154)	
Δr^+			0.732*** (0.168)
Δr^-			-0.047 (0.196)
R^2	0.799	0.813	0.818
Adjusted R^2	0.798	0.811	0.816
F	782.865	534.044	539.954
Observations	291	290	290

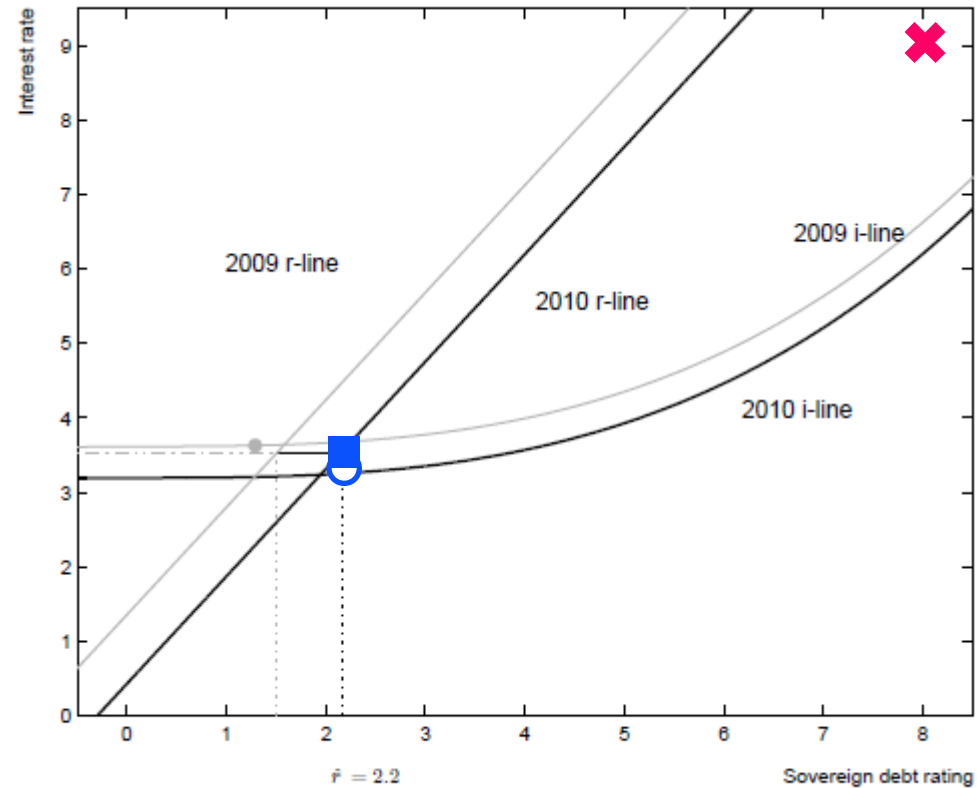


(a) Temporary rating shock.



(b) Permanent rating shock.

Ireland in 2010



Main contributors to shift of *r* line by 0.7 notches

Exploding debt ratio	From 65% to 98.5%
Other fundamentals	very much neutralized each other

Ireland in 2010

Details:

Aid to distressed banking sector	€31 bn
2009 deficit	€28.5 bn
Total deficit	[31.3% of GDP]

21 November:

Ireland becomes the first country to ask for an **international bailout**

Ratings by year's end:

Standard & Poor's: A; watch negative

Moody's: Baa1; outlook negative

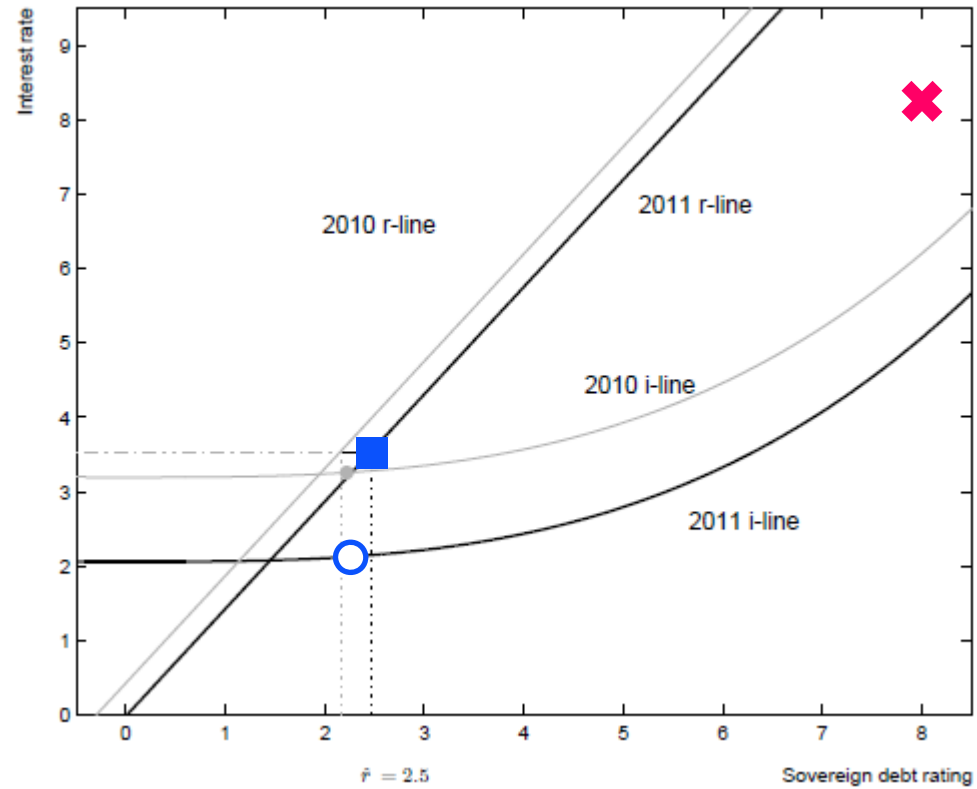
Fitch: BBB+; watch negative

Main contributors to shift of *r* line by 0.7 notches

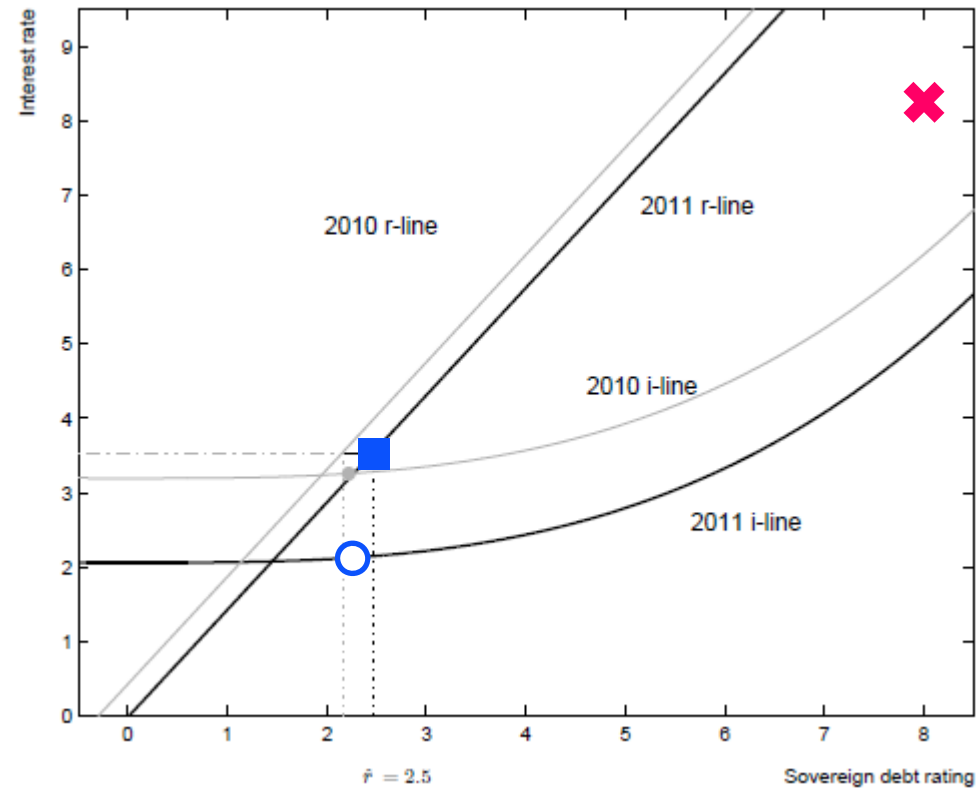
Exploding debt ratio	From 65% to 98.5%
Other fundamentals	very much neutralized each other

Ireland in 2011

Government bonds market
Enter rating agencies
Case: Ireland's odyssey
Conclusions



Ireland in 2011



Main contributors to shift of *r* line by 0.3 notches

Various fundamentals

Mixed effect from slight improvements and further deteriorations

Predicted versus actual ratings

Government bonds market
 Enter rating agencies
Case: Ireland's odyssey
 Conclusions

Year	Ratings predicted by model using				Actual ratings (end of year)*		
	fundamentals only (impact effect)	fundamentals and the predicted interest rate	fundamentals and their long-run equilibrium effect	fundamentals and the actual interest rate	Fitch	Moody's	Standard & Poor's
2007	-0.3	-0.3	0.4	-0.3	1 (AAA; os)	1 (Aaa; os)	1 (AAA; os)
2008	1.1	1.8	0.9	1.5	1 (AAA; os)	1 (Aaa; os)	1 (AAA; os)
2009	1.5	1.3	1.6	2.2	4 (AA-; os)	2.5 (Aa1; on)	4.5 (AA; on)
2010	2.2	2.3	1.9	3.3	8 (BBB+; os)	8.5 (Baa1; on)	6.5 (A; wn)
2011	2.5	2.3	1.5	4.2	8.5 (BBB+; wn)	11.5 (Ba1; on)	8.5 (BBB+; wn)

*os = outlook stable; on = outlook negative; wn = watch negative. We translated negative outlooks or watches as a 0.5 add-on in the numerical scale

Conclusions I

1. The main trigger and driving force behind Ireland's budget and debt problems is the financial crisis that erupted in 2008 and its effect on government revenues and spending. Therefore, **the labels *debt crisis* and *euro crisis* are misnomers that hide causes behind symptoms.**
2. While the budgetary and general economic consequences of the financial crisis may have justified a downgrade of Ireland by some 2 notches, **actual downgrades** (or risk perceptions) were massively higher and **exceeded 'predicted' downgrades by 6 to 9 notches.**
[Similar results obtain for other countries. Measured against regression results that look for a consistent relationship between sovereign debt ratings and a standard set of fundamentals, **downgrades of peripheral countries in the Eurozone appear arbitrary.**]
3. Since multiple equilibria and self-fulfilling prophecy loom in the market for government bonds, overreactions or misjudgements of financial markets in general and of **rating agencies** in particular **may have deepened Europe's 'debt crisis' way beyond what the financial crisis would have caused directly.**

Conclusions II

4. When multiple equilibria and self-fulfilling prophecy loom, **sovereign debt ratings may put entire countries at risk**. This is aggravated because

- ratings **lack transparency**.
- whether ratings are justified or not appears impossible to judge.
- there are **serious conflicts of interest**.
- rating agencies are evolving into **active players in the political arena**.
- agencies may **lack the expertise** required to issue judgment on sovereign default risk.

5. Therefore

- *Ideally*:
 - **Sovereign ratings should be eliminated from the government bonds market.**
 - *Second best*:
 - Sovereign debt ratings need to become much more transparent.
 - we need a comprehensive legal framework for suing rating agencies.
 - conflicts of interest must be eliminated.
- Mind: **Rating agencies thrive on the size of the financial industry.**