The determination of bond yield spreads in Greece and the euro area: what can they tell us about the crisis?

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Introduction

Motivation for paper:

- To examine the role that fundamentals play in determining spreads
- Beyond fundamentals, to investigate the role of ratings. Gut feeling – rating downgrades seemed to have self-reinforcing effect leading to higher spreads and further downgrades – we want to investigate this.

We first look at the Greek case.

Given the broadening of the crisis towards the end of 2010, we move on to examine a panel of 10 euro area countries.

Plan of the presentation

1. The determinants of spreads

3. Data

4. Greek case

5. Broadening of the analysis beyond Greece

6. Conclusion

1. The determination of spreads

- Fiscal variables
  - gross debt-to-GDP ratio (+)
  - general government balance as % of GDP (-)
  - cumulative fiscal news – revisions to EC forecasts of each country's fiscal deficit – cumulated – equivalent to stock of good (bad) news that has inflicted the country (-)
- Growth – important determinant of debt sustainability

- Competitiveness
  - Relative prices – HICP of specific country relative to Germany (+)
  - Current account (-)

- Securities Market Programme (-) – ECB programme to purchase government bonds
  - initial programme (mid-2010 – early 2011) involved Greek, Irish and Portuguese bonds
  - second period (August 2011 – early 2012) witnessed intervention in markets for Spanish, Irish, Italian and Portuguese bonds

2. The data

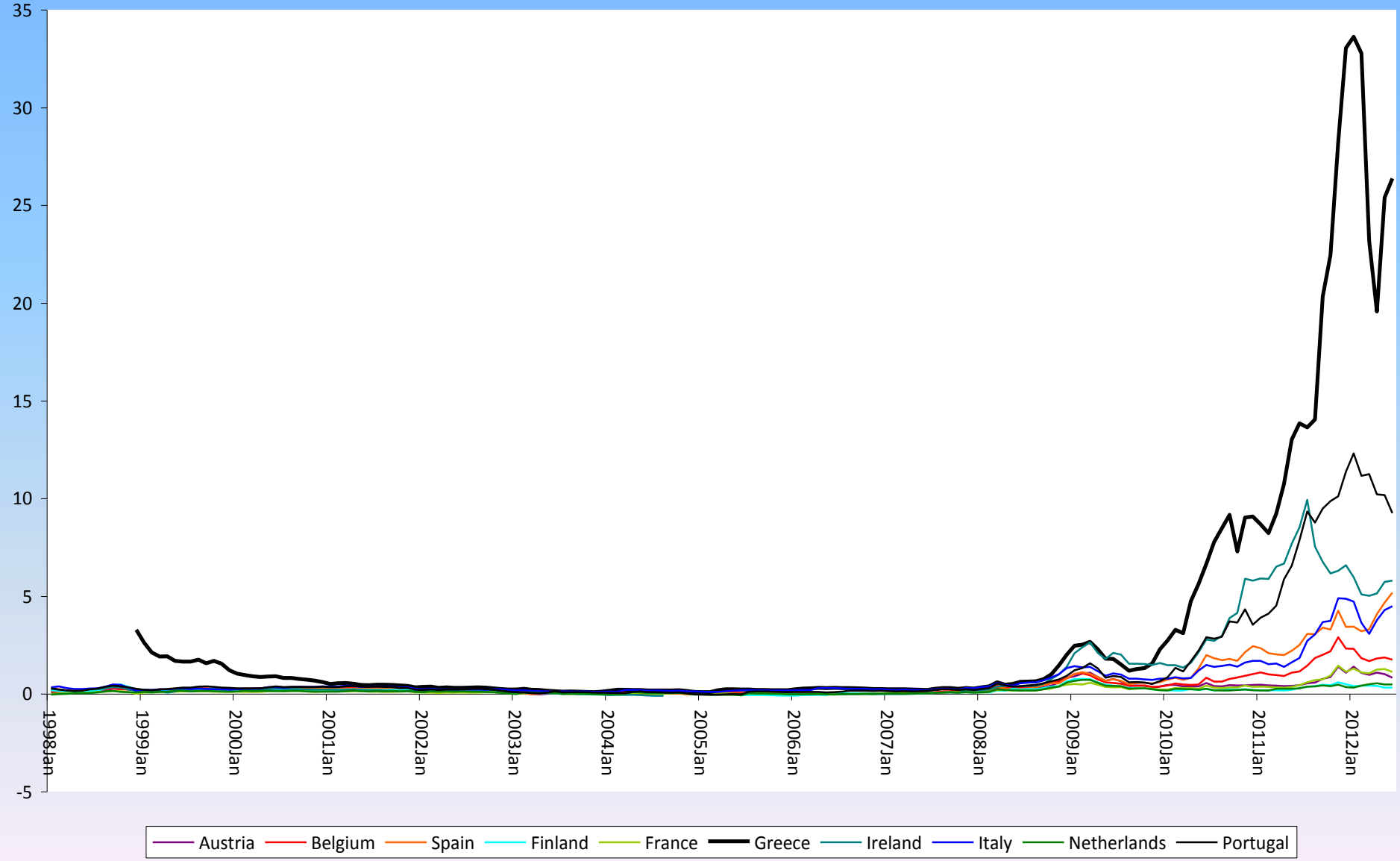
Countries: Austria, Belgium, Finland, France, Greece, Ireland, Italy, The Netherlands, Portugal, Spain

Where relevant: variables measured relative to Germany

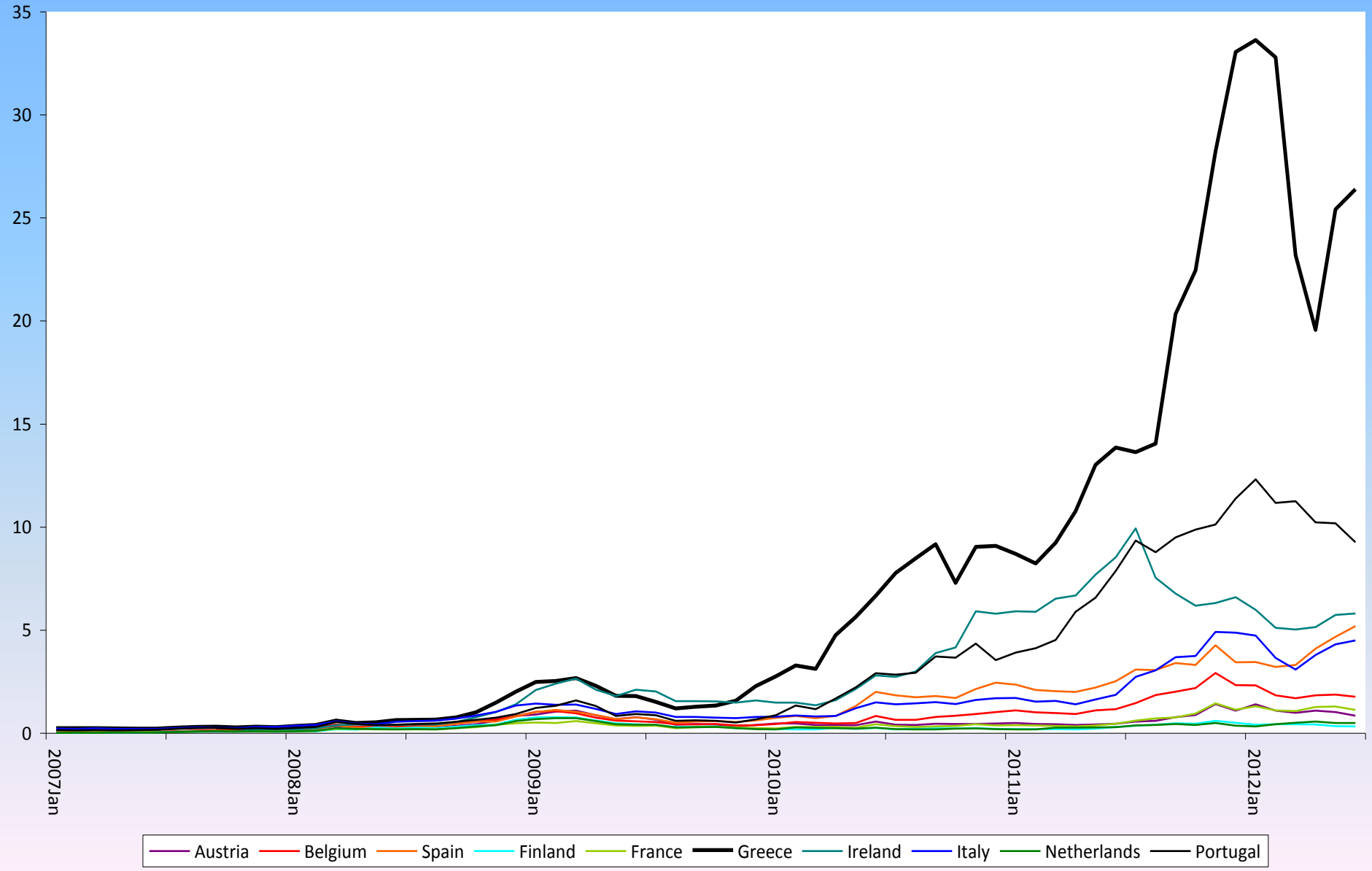
Data is monthly – interpolated where necessary

Time period: 1998m1- 2012m6 – not all countries have full period

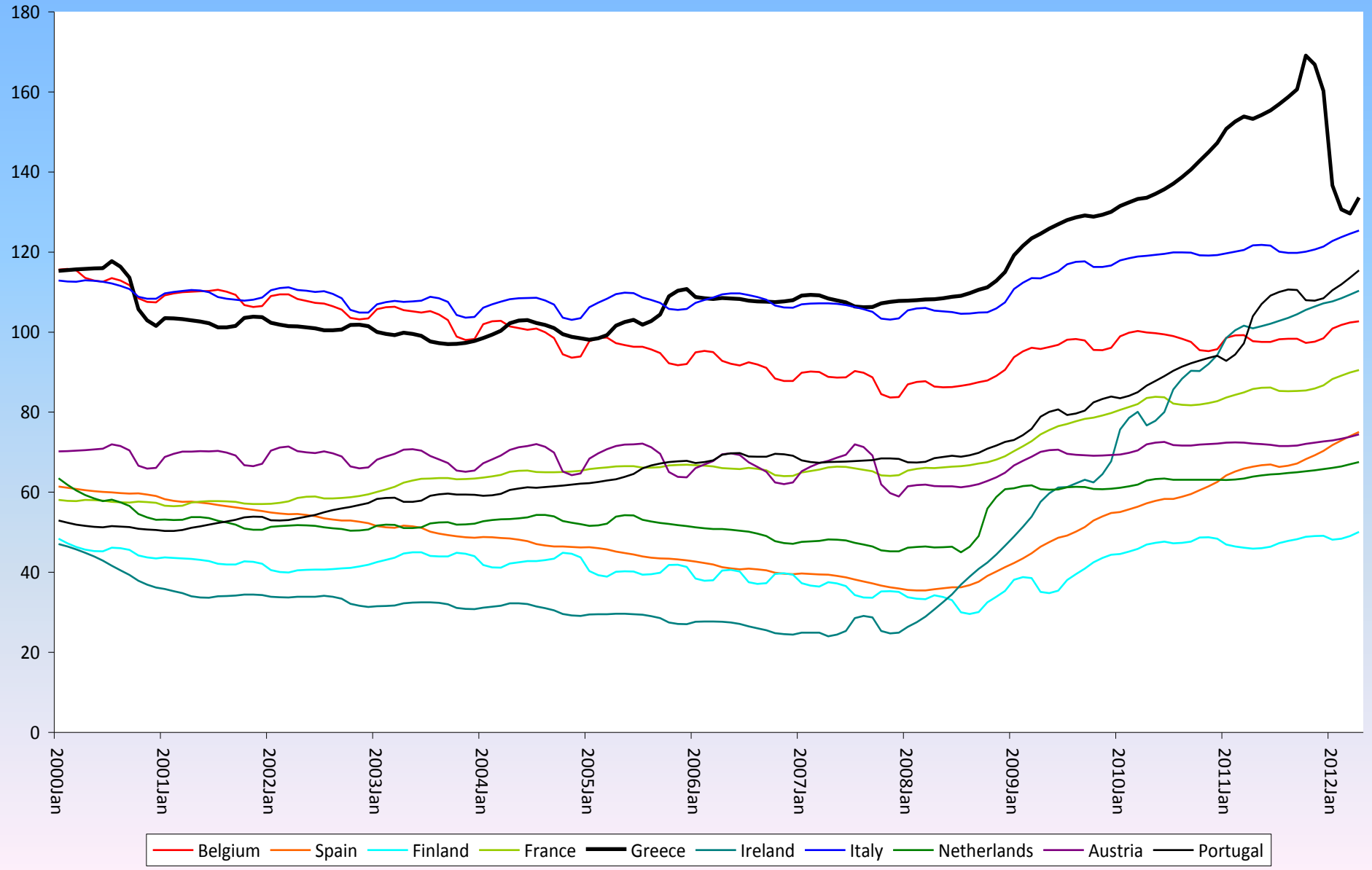
Spreads on 10-year government bonds relative to Germany



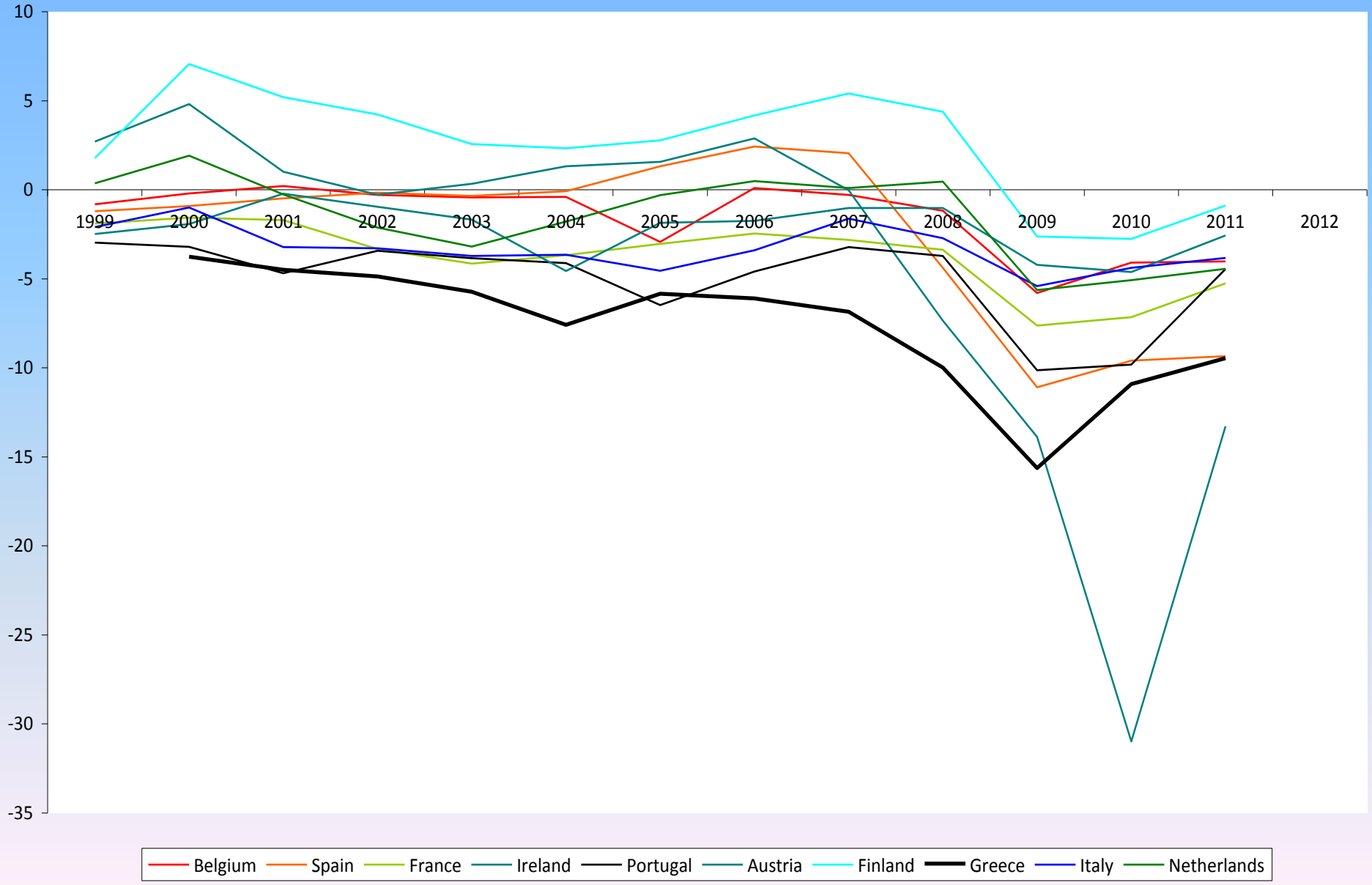
The Crisis period in more detail



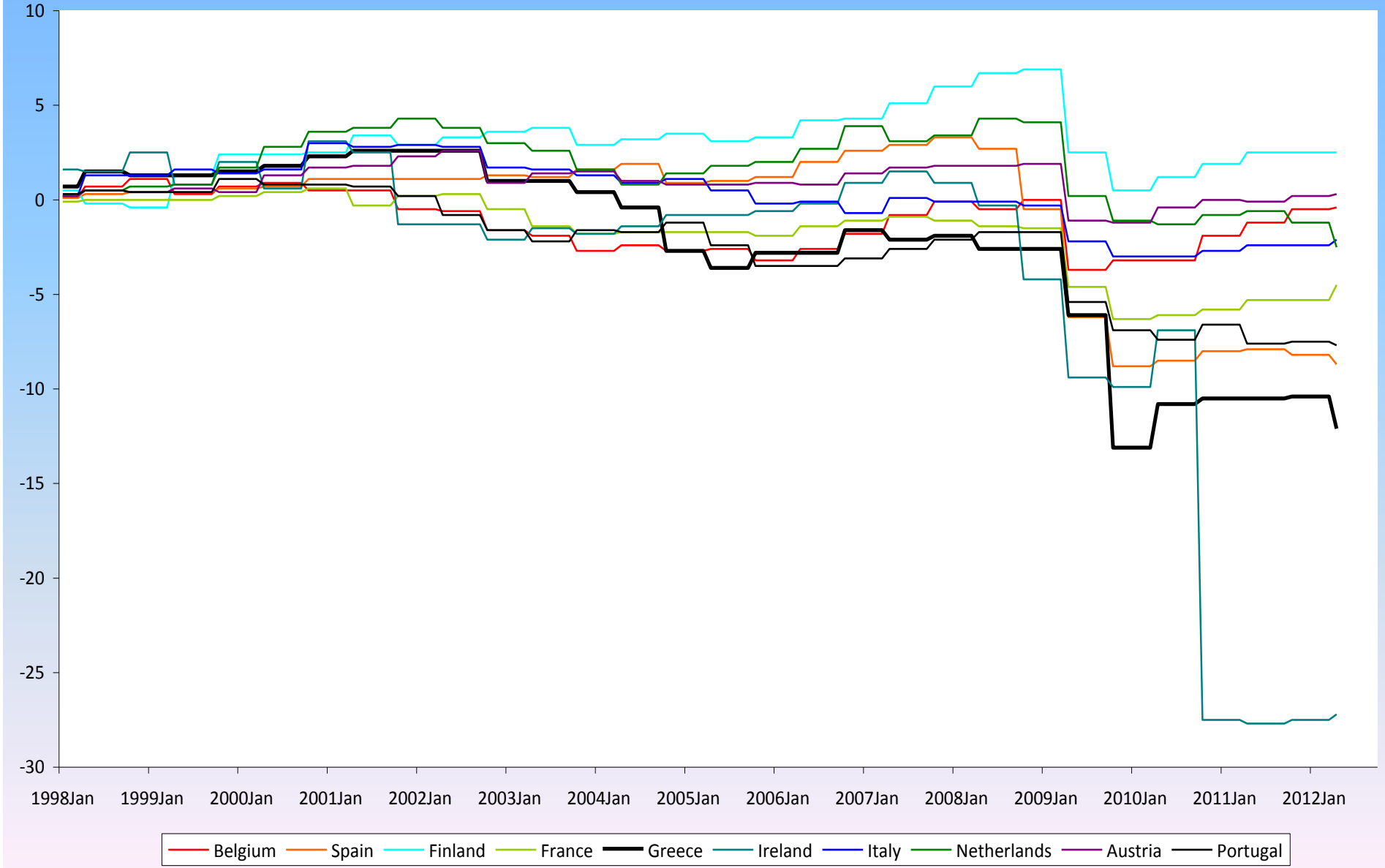
Debt-to-GDP ratios



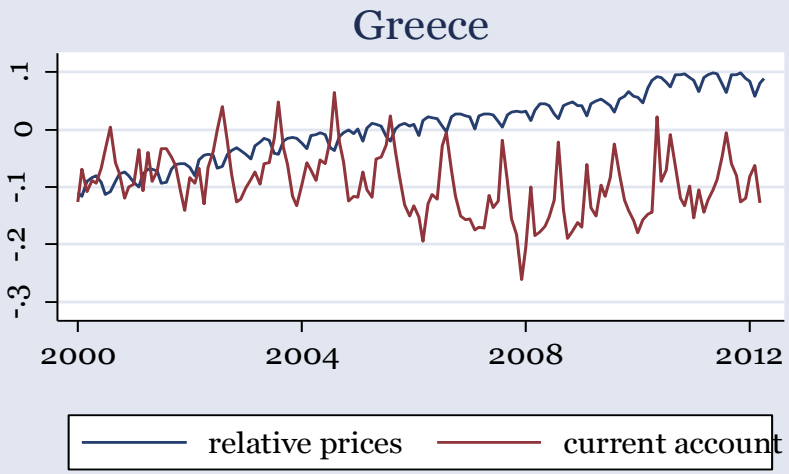
Deficit-to-GDP Ratios

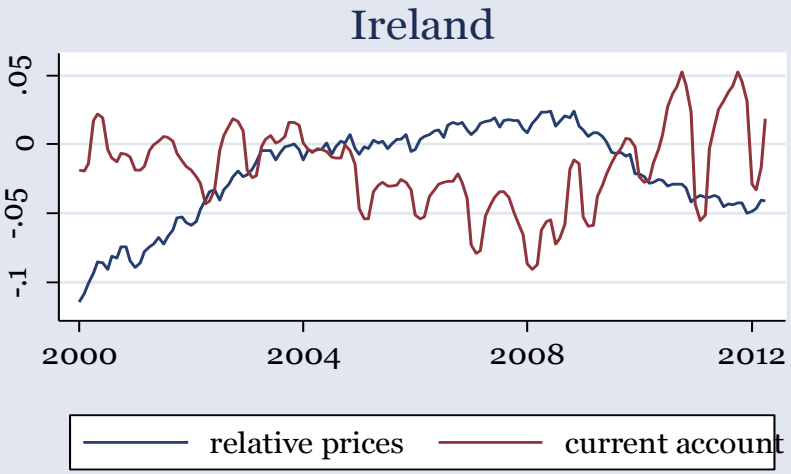


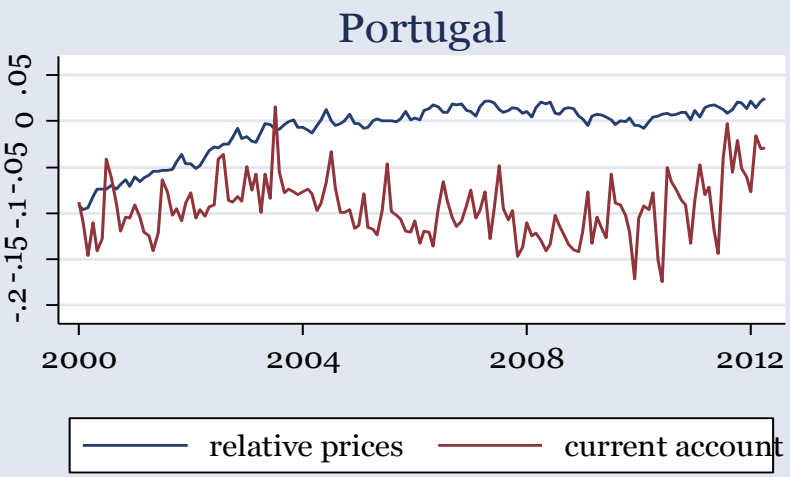
Cumulated Fiscal News



Relative prices and current account ratios







3. The Greek case

	coefficient	't' stat
Constant	-15.983	-3.628
Current account to GDP	6.466	0.983
Relative prices	4.988	0.498
Fiscal deficit	0.290	3.341
Debt	0.184	4.623
Fiscal news	-0.037	-2.927
Real growth	-216.407	-2.934
SMP	-5.390	-3.474

Current account wrong sign; relative prices not significant

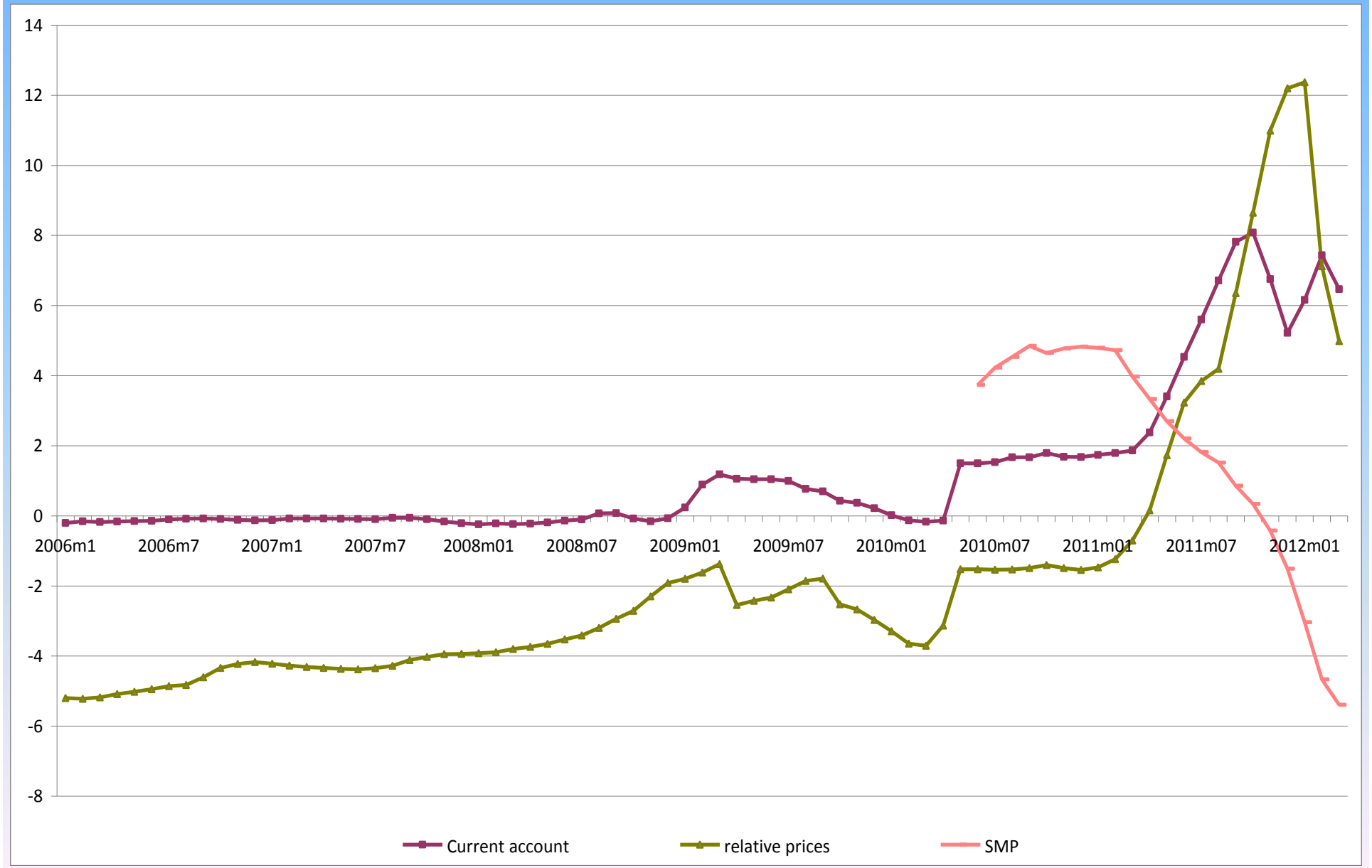
SMP is a dummy for the ECB's security markets programme

Estimation for Greece before the crisis (up to end-2007)

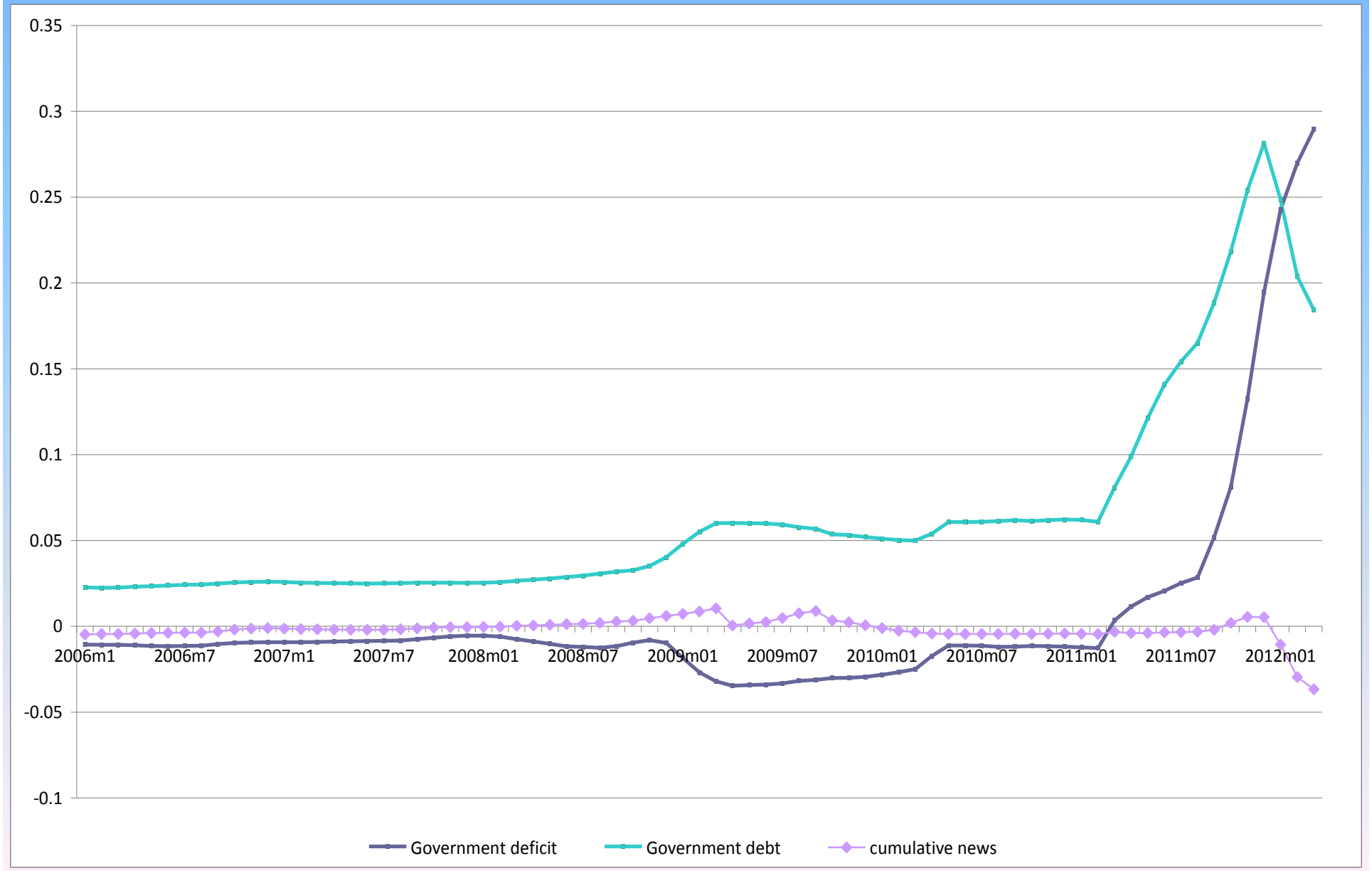
	coefficient	't' stat
Constant	-2.451	-14.147
Current account to GDP	-0.211	-1.212
Relative prices	-3.939	-11.79
Fiscal deficit	-0.005	-2.407
Debt	0.025	14.779
Fiscal news	-0.001	-0.257
Real growth	-0.714	-0.349

The results suggest that before the crisis markets had not been reacting to fundamentals – only really debt which is correctly signed **and** significant

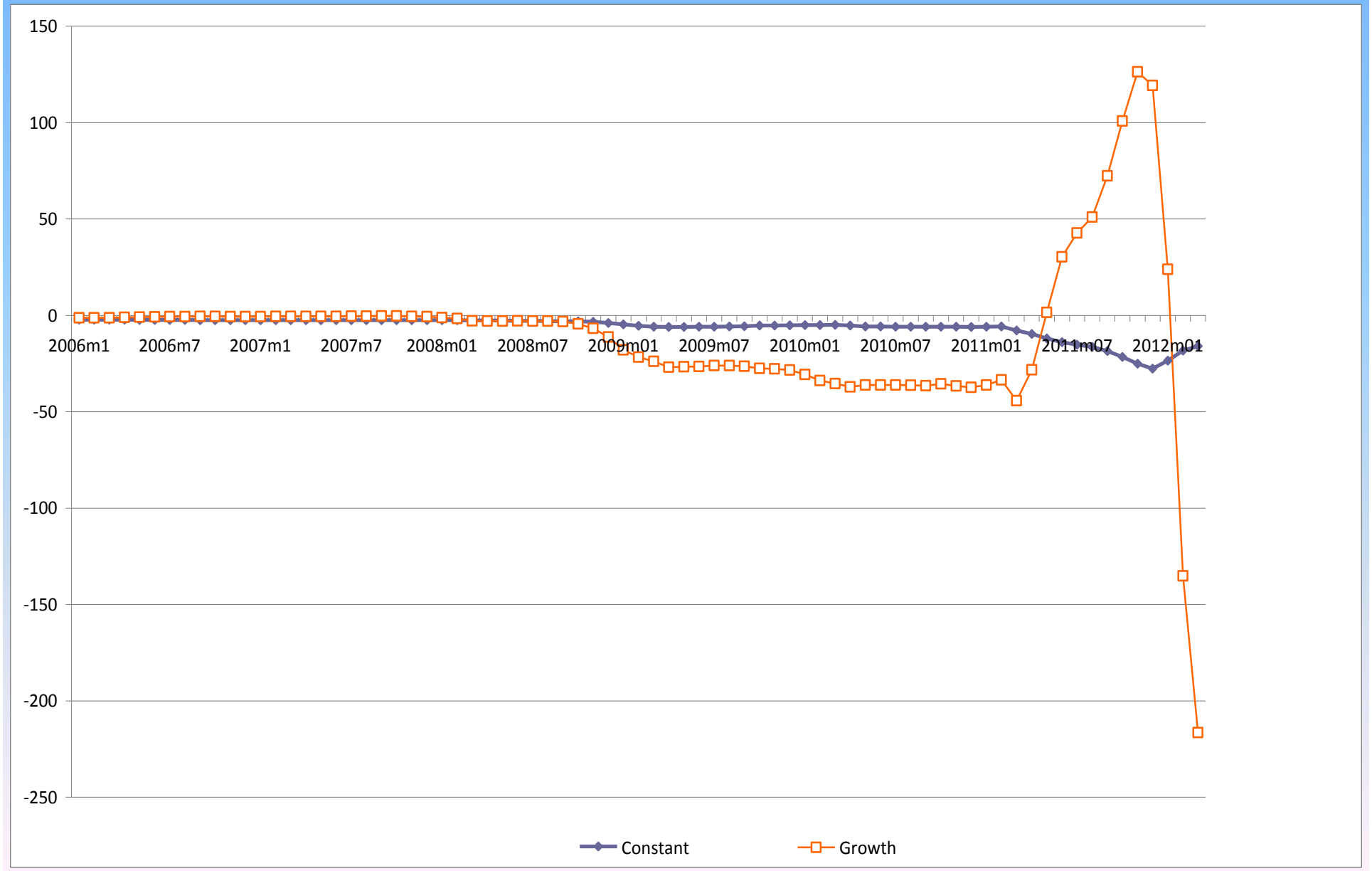
Recursive coefficients on current account, relative prices and SMP



Recursive coefficients on the fiscal variables



Recursive coefficient on growth



We now consider the effect of ratings

We assign a value from 1-20 on the basis of which rating agency (S&P or Fitch, Moodys) seemed to move first.

Ratings dominate fundamental, although of course they may be capturing the same information

Here ratings are assumed to be cardinal

	coefficient	't' stat
Constant	-2.940	-1.262
Current account to GDP	-2.304	-0.684
Relative prices	8.461	1.663
Fiscal deficit	0.049	1.073
Debt	-0.066	-2.775
Fiscal news	0.003	0.482
Real growth	-78.689	-2.067
SMP	-0.127	-0.152
Ratings	1.817	20.028

A model containing separate dummies for each rating

Suggests strong non-linearity as the rating gets worse

	Coeff.	't' stat
Rating A	0.184	0.416
Rating A-	2.318	2.968
Rating BBB+	3.597	2.190
Rating BBB-	5.289	2.815
Rating BB+	8.831	5.288
Rating BB-	13.412	6.057
Rating B	16.306	7.376
Rating CC	29.114	17.052
Rating CCC	17.520	8.846
Rating SD	20.996	9.759

What determines ratings?

A regression with ratings as the dependent variable

Seems fundamentals largely determine ratings

	coefficient	't' stat
Constant	-7.180	-3.432434
Current account to GDP	4.827	1.545852
Relative prices	-1.912	-0.402008
Fiscal deficit	0.132	3.218648
Debt	0.138	7.279266
Fiscal news	-0.022	-3.690119
Real growth	-75.812	-2.164686
SMP	-2.897	-3.932660

We now add the residual from the ratings equation to the spread equation

This might be thought of as any information the ratings have other than the fundamentals we consider, e.g. political risk, or possibly ratings having a self fulfilling effect

	coefficient	't' stat
Constant	-15.983	-7.145
Relative prices	4.988	0.981
Fiscal deficit	0.290	6.580
Debt	0.184	9.105
Fiscal news	-0.037	-5.764
Real growth	-216.407	-5.778
SMP	-5.390	-6.841
Residuals from ratings equation	1.817	20.028

4. Broadening the analysis beyond Greece

We now turn to a panel of 10 euro area countries and begin with a fixed effect panel regression looking at the effect of fundamentals

A fixed effect panel model for our 10 countries

Everything correct and significant with the exception of SMP, so we drop this variable

	coefficient	't' stat
Constant	-6.773	-17.84
Current account to GDP	-1.113	-1.758
Relative prices	18.233	11.212
Fiscal deficit	0.0796	8.485
Debt	0.108	20.252
Fiscal news	-0.001	-1.970
Real growth	-81.70	-6.218
SMP	0.575	2.060

The basic panel data model

Everything significant and correctly signed

	coefficient	't' stat
Constant	-7.019	-19.462
Current account to GDP	-1.088	-1.717
Relative prices	18.458	11.363
Fiscal deficit	0.080	8.526
Debt	0.112	22.209
Fiscal news	-0.002	-2.101
Real growth	-84.218	-6.431

Testing the pooling assumption

Pooling across the panel amounts to the idea that every country is treated the same by the markets. We can test this in the following way. Augment a standard panel data regression with a set of country and variable specific dummies.

$$y_{it} = \beta_{0i} + \sum_{j=1}^{k} \beta_j x_{ijt} + \beta^* D_{ijt} x_{ijt} + v_{it}$$

Then we may test pooling for every variable for every country

	Current account		Relative prices		Deficit-to-GDP ratio		Debt-to-GDP ratio		Cumulative fiscal news		GDP growth	
	β*	t-stat	β*	t - stat	β*	t-stat	β*	t-stat	β*	t-stat	β*	t - stat
β_m	-1.09		18.5		-0.08		0.11		-0.002		-84.2	
GR	**12.01***	**4.6**	**26.4**	**8.5**	0.05	1.5	**0.17**	**19.7**	**-0.03**	**-6.0**	**-61.0**	**-2.1**
BE	**-8.9**	**-4.5**	**32.7**	**4.4**	**-0.1**	**-3.9**	**-0.09**	**-5.9**	-0.03	-1.1	66.7	-1.2
ES	-1.7	-0.4	-1.1	-0.3	-0.004	-0.1	-0.01	-0.7	0.01	1.7	**-136.1**	**-2.3**
FR	**49.5***	**6.7**	**-83.1***	**-7.0**	0.03	0.8	**-0.02**	**-7.7**	**0.04***	**4.3**	88.8	1.4
FN	3.0	1.1	**-38.6***	**-3.6**	-0.04	-1.2	**-0.1**	**-3.5**	0.02	1.5	21.2	0.8
IR	-2.9	-0.6	**-8.6**	**-1.8**	0.03	1.9	**-0.09**	**-8.0**	**0.03***	**7.1**	**83.6**	**3.4**
IT	2.3	0.3	-6.8	-1.2	-0.06	-1.2	-0.005	-0.2	-0.03	-1.2	-61.2	-1.3
NL	-6.6	-1.5	-10.6	-1.4	0.07	1.6	**-0.08**	**-3.4**	0.03	1.7	66.3	1.3
OE	9.0	1.7	-6.8	-0.5	-0.06	-1.2	-0.07	-1.6	-0.01	-0.02	-4.7	-0.09
PT	**18.5***	**4.3**	**-38.5***	**-7.5**	0.06	1.5	0.01	1.0	**-0.06**	**-9.3**	-81.8	-1.9

Pooling is rejected for Greece for every variable except the deficit.

Generally Greece is being treated much more harshly than the other countries

Country	F-test Critical value at 1% = 1.8
Belgium	3.6
Spain	0.16
Finland	1.1
France	3.3
Greece	26.5
Ireland	12.9
Italy	0.2
The Netherlands	0.8
Austria	0.3
Portugal	5.8

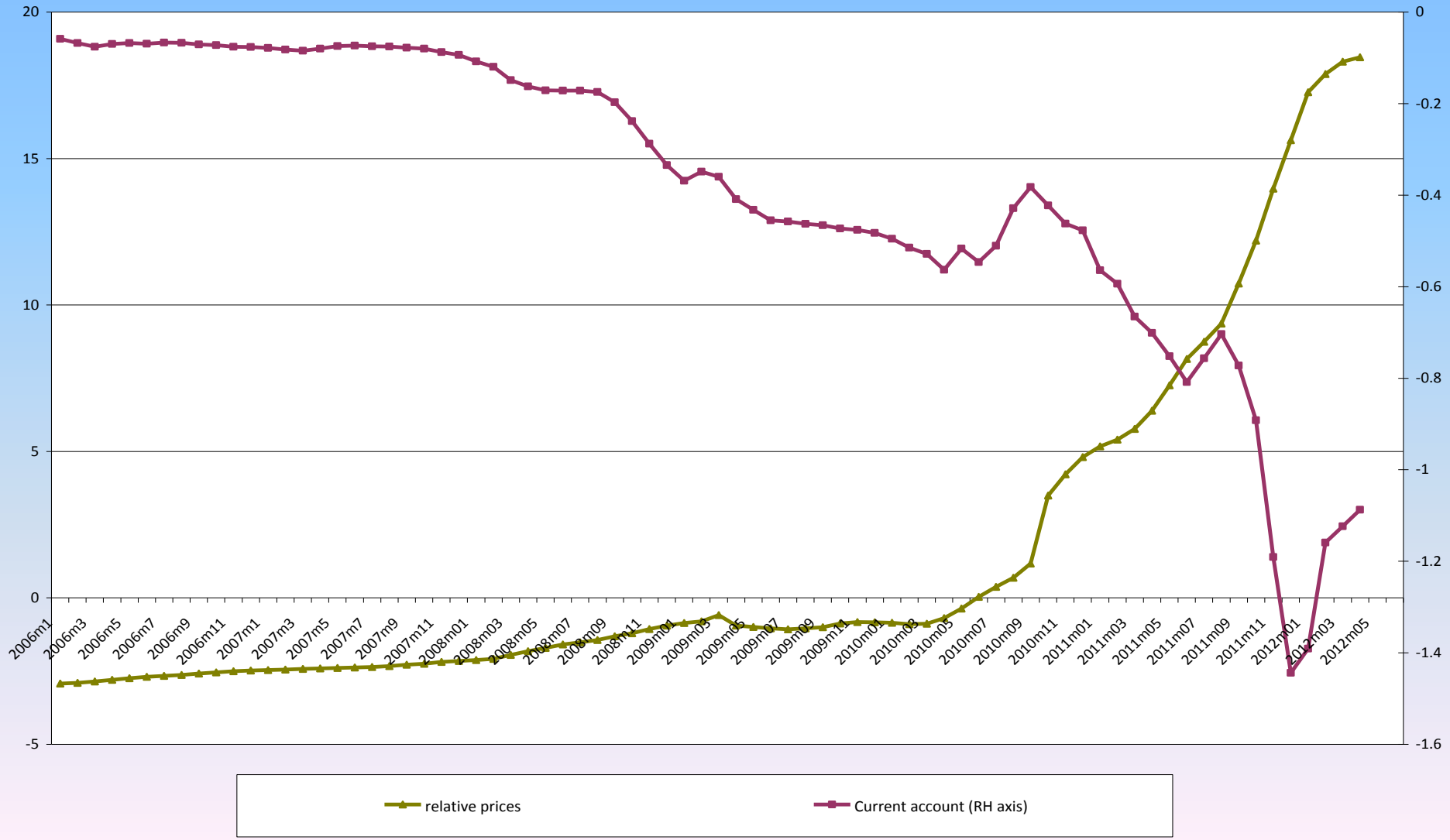
We can also test pooling by country using this technique

Here we can clearly reject pooling for Greece, Ireland and Portugal

Also for France and Belgium (but in the opposite direction)

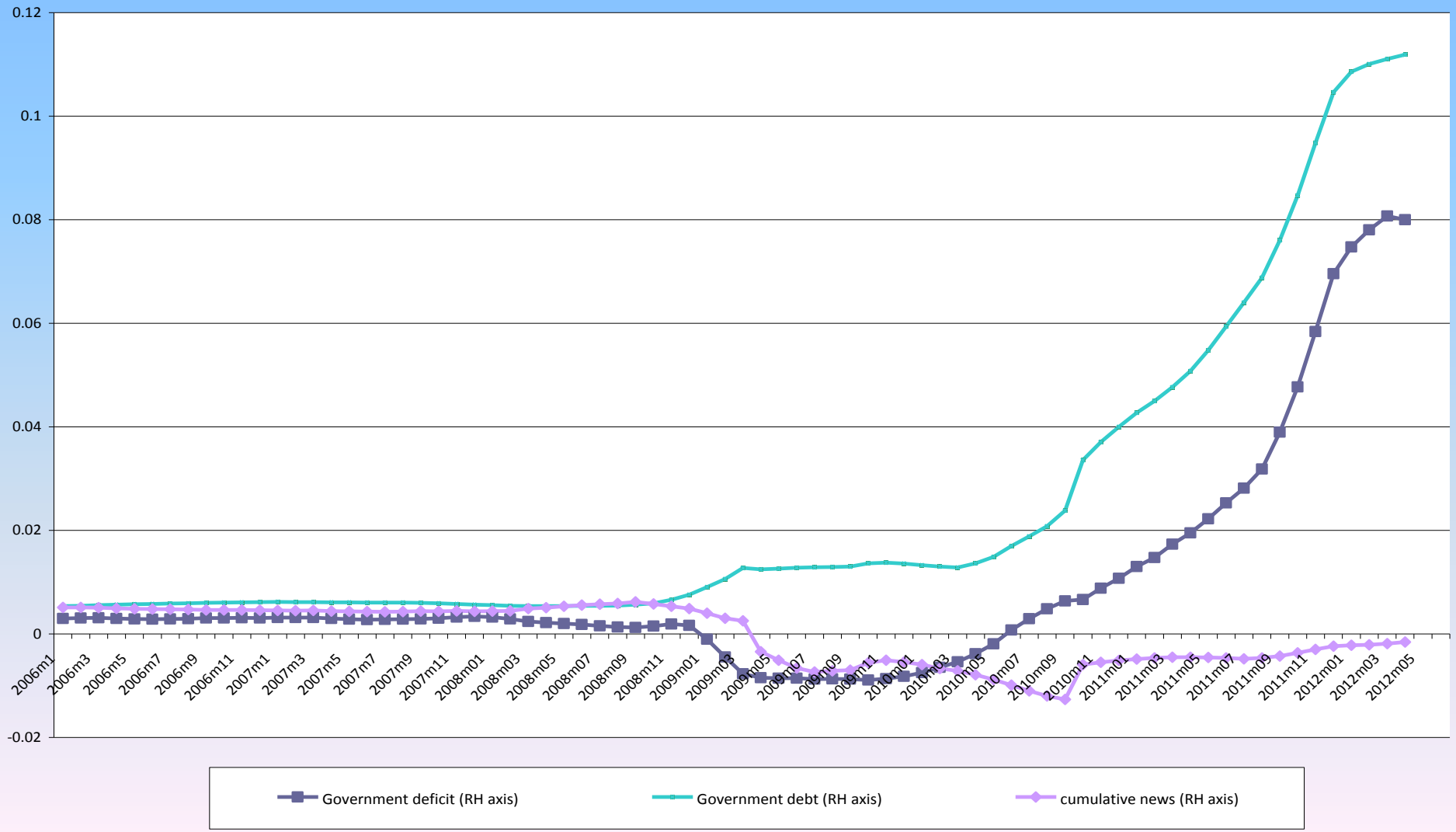
Recursive fixed effect panel estimation

Coefficients for relative prices and the current account

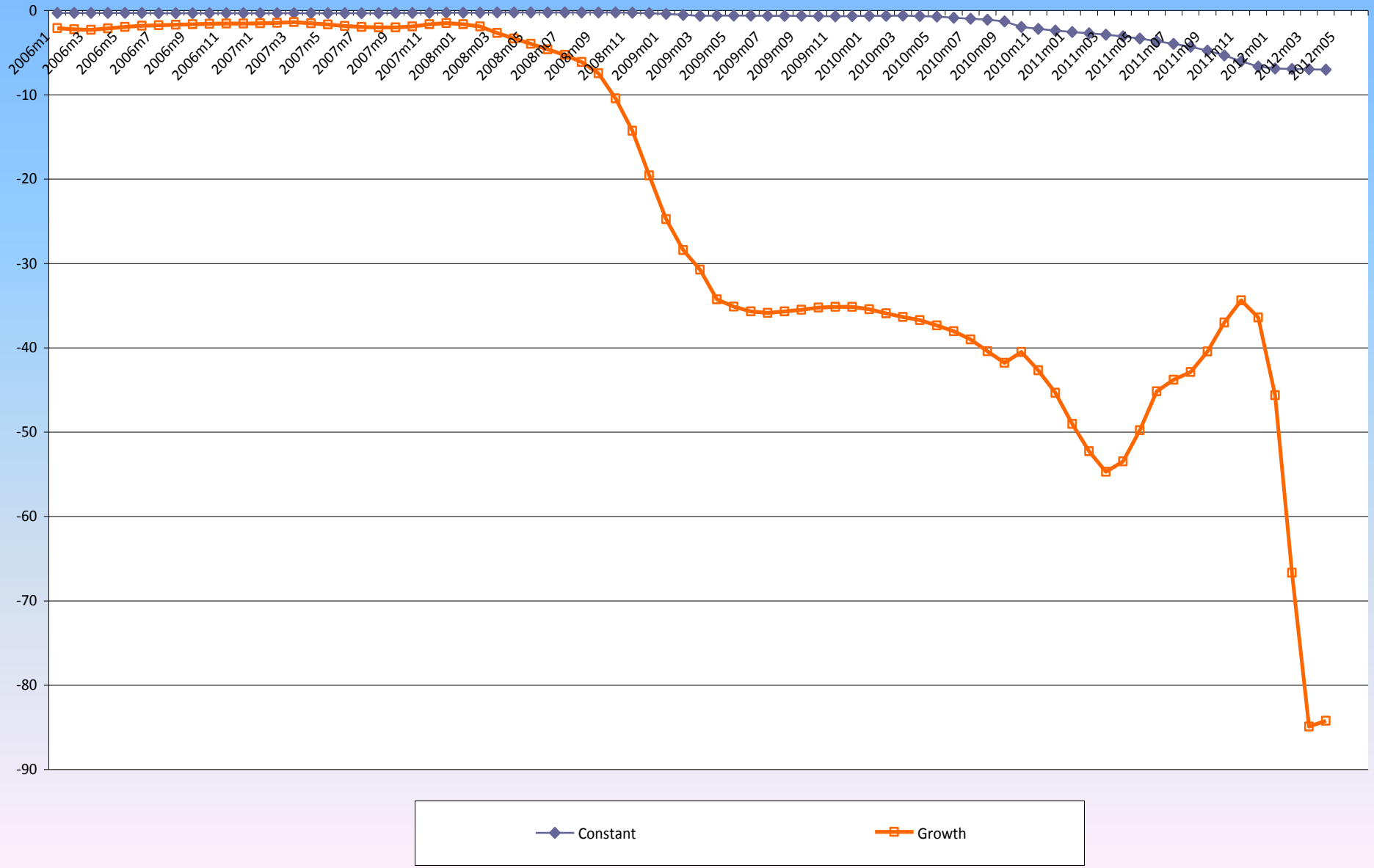


Recursive coefficients for deficit, debt and news

Again market behaviour seems to have been modified substantially by the crises



Recursive coefficients for growth



We now repeat the experiment with a cardinal ratings measure for the panel.

As in the single country case ratings do most of the work and fundamentals appear less important.

	coefficient	't' stat
Constant	-1.024	-4.472
Current account to GDP	-2.489	-6.961
Relative prices	5.413	5.741
Fiscal deficit	0.008	1.521
Debt	-0.029	-7.679
Fiscal news	0.002	3.7187
Real growth	-38.095	-5.135
Ratings	1.482	56.690

A model with ratings as a set of dummies - Evidence of strong non-linearities

AAA	-3.359	-9.665
AA+	-3.030	-9.183
AA	-2.656	-8.476
AA-	-2.720	-8.910
A+	-2.026	-6.675
A	-1.389	-4.450
A-	-0.737	-2.417
BBB+	-0.471	-1.469
BBB-	4.637	14.056
BB+	4.685	12.311
BB	2.306	5.292
BB-	7.242	9.728
B	9.629	12.920
CCC	10.421	18.079
CC	22.908	55.121
SD	19.261	25.787

Ratings as the dependent variable

Fundamentals determine ratings

	coefficient	't'-stat
Constant	-4.008	-20.186
Current account to GDP	0.950	2.704
Relative prices	8.970	10.05
Fiscal deficit	0.049	9.402
Debt	0.095	33.98
Fiscal news	-0.002	-5.077
Real growth	-30.095	-4.196

We now add the residual from the ratings equation to the spread equation

Fundamentals still work but there is also a big non-fundamental impact from the ratings agencies.

	coefficient	't' stat
Constant	-6.989	-34.419
Current account to GDP	-1.081	-3.031
Relative prices	18.71	20.455
Fiscal deficit	0.081	15.247
Debt	0.112	39.325
Fiscal news	-0.002	-3.657
Real growth	-82.692	-11.215
Residuals from ratings equation	1.482	56.690

5. Conclusion

In the case of Greece:

Markets have clearly changed their behaviour over the course of the crisis.

Ratings are reflecting much more than just standard fundamental information.

For the 10 Euro zone countries:

Panel estimation reveals a strong disparity in the way countries are treated by markets.

Ratings again have a big influence well beyond the simple reflection of fundamentals