

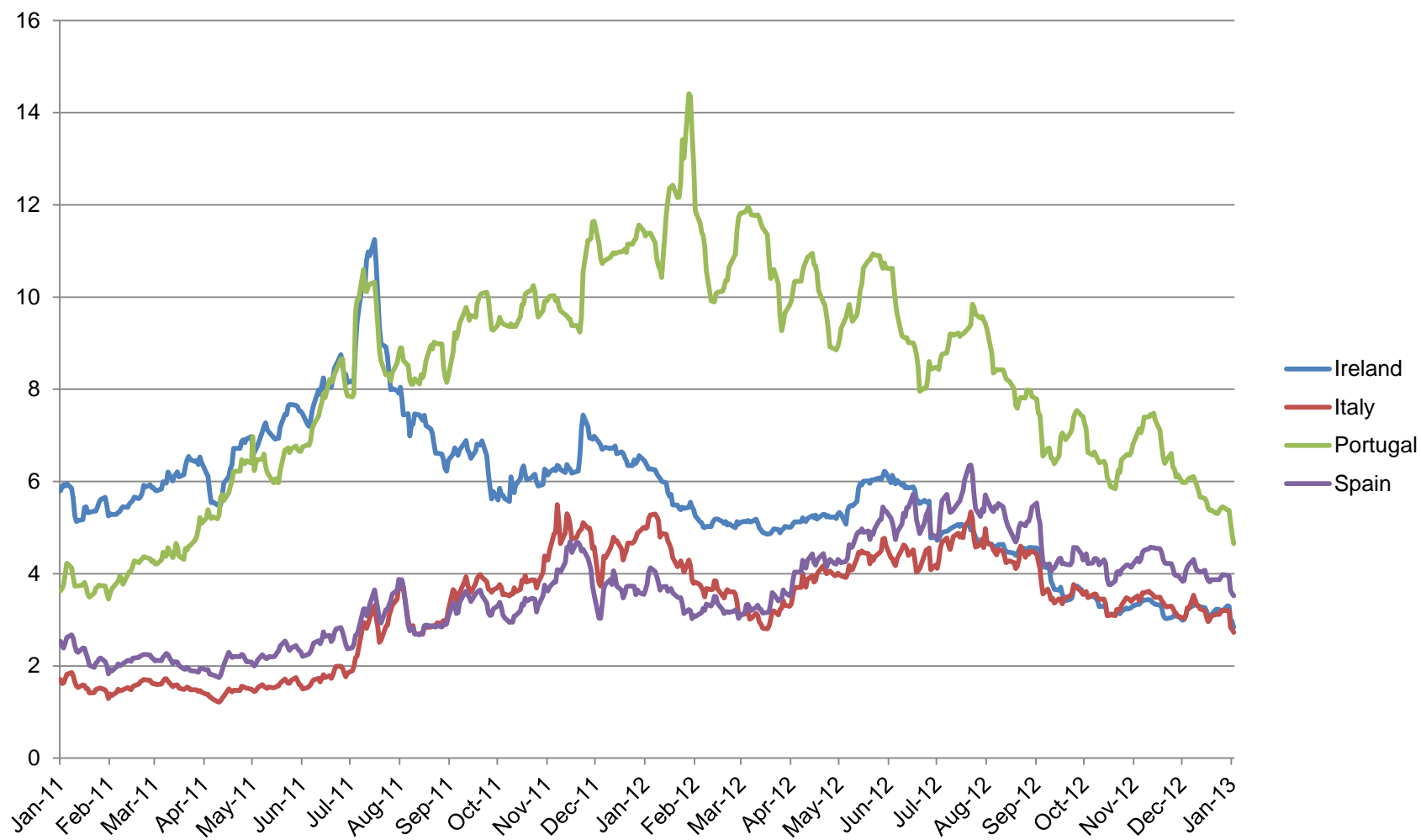
SUSTAINABILITY OF EUROPEAN SOVEREIGN DEBT

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Bond Spreads in Crisis Countries



The Model

$$1) Y_t = Y_{t-1}[1 + g_t][1 + \dot{p}_t]$$

$$2) DEF_t = INT_t - PS_t$$

$$3) INT_t = \sum_k D_{k,t-1} r_{kt} - FA_{t-1} r_{at}$$

$$4) PS_t = \pi_t Y_t$$

The Model cont.

$$5) NBR_t = DEF_t + DDIS_t - Z_t$$

$$6) GBR_t = NBR_t + AMZ_t + \Delta FA_t$$

$$7) AMZ_t = D_{1t} + A_{2t} + A_{3t};$$

$$8) B_{3t} = GBR_t - D_{1,0}$$

$$9) D_{1t} = D_{1,0}; D_{2t} = D_{2,t-1} - A_{2t}; D_{3t} = D_{3,t-1} + B_{3t} - A_{3t}$$

Contingent State Correlation

Probability that variable “i” is in state “s” in scenario “k”:

$$\begin{aligned} A1) p_{ik} &= \alpha \text{ if } s_{ik} = 2 \text{ [baseline];} \\ &= \beta + \delta \sum_{j \in A} \rho_{ij} - \delta \sum_{j \in B} \rho_{ij} \text{ if } s_{ik} \neq 2 \\ &\text{[1=unfavorable, 3 = favorable]} \end{aligned}$$

Set “A”: other variables in the same state as i

Set “B”: other variables in opposite state from i

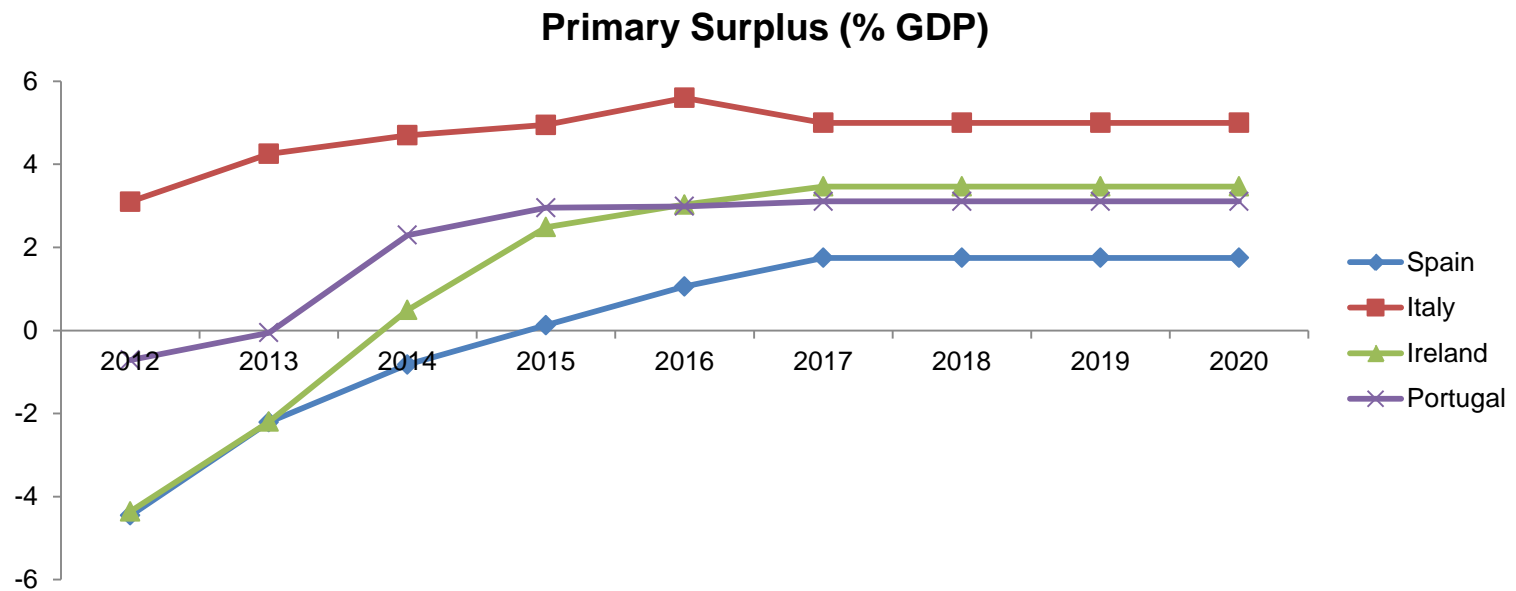
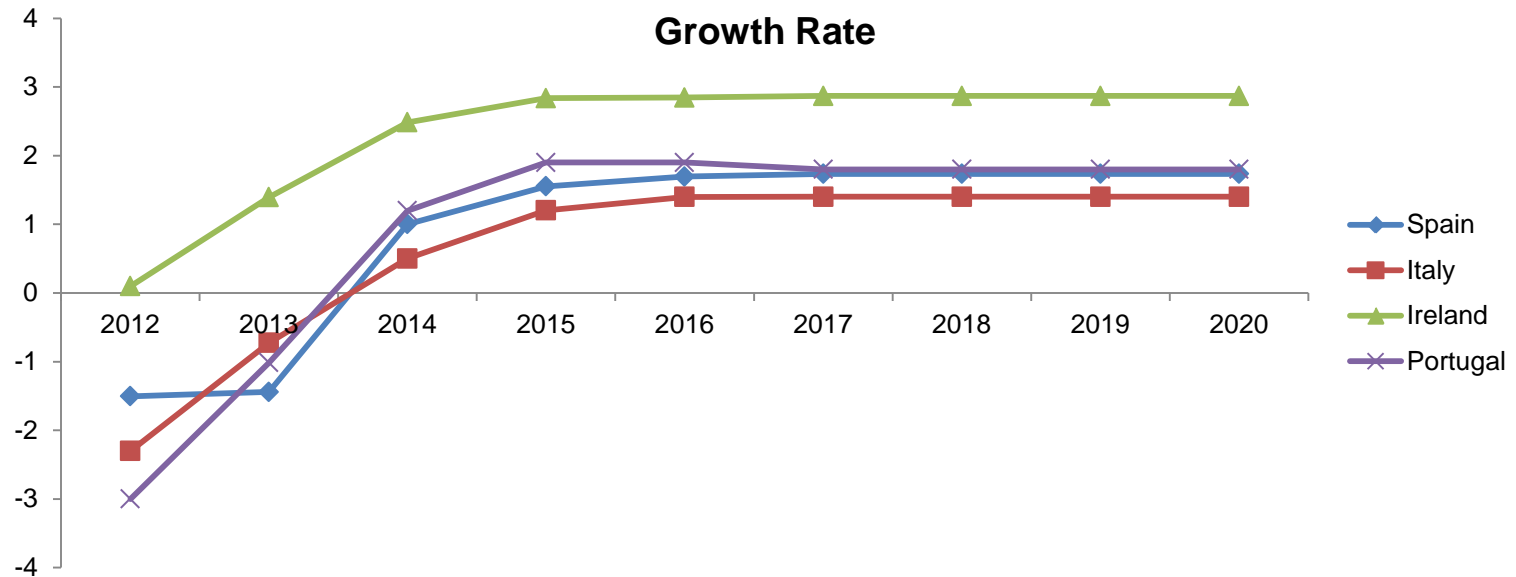
Correlation coefficient between states for five economic variables

	Growth (g)	Primary surplus (π)	Interest rate (r)	Bank recapitalization and debt discovery (DDIS)	Privatization (Z)
g	1	0.2	1	0.5	0
π	0.2	1	-0.5	0	-1
r	1	-0.5	1	1	0
DDIS	0.5	0	1	1	0
Z	0	-1	0	0	1

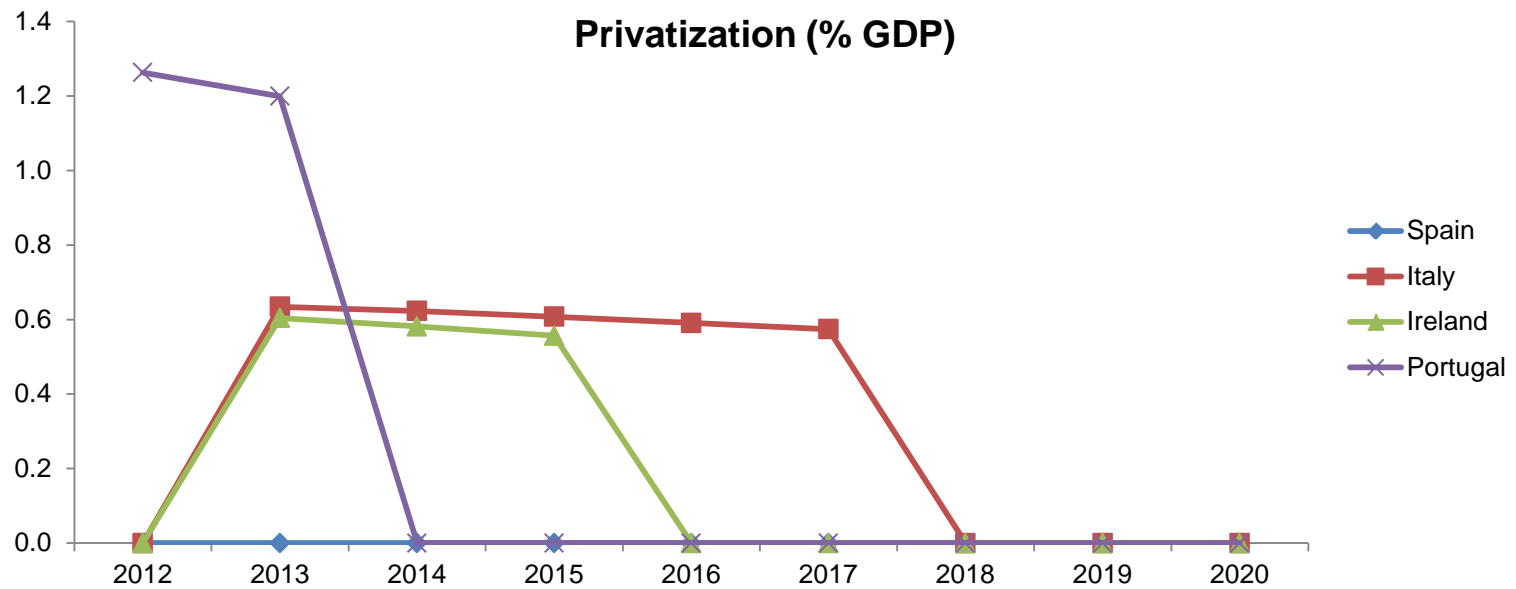
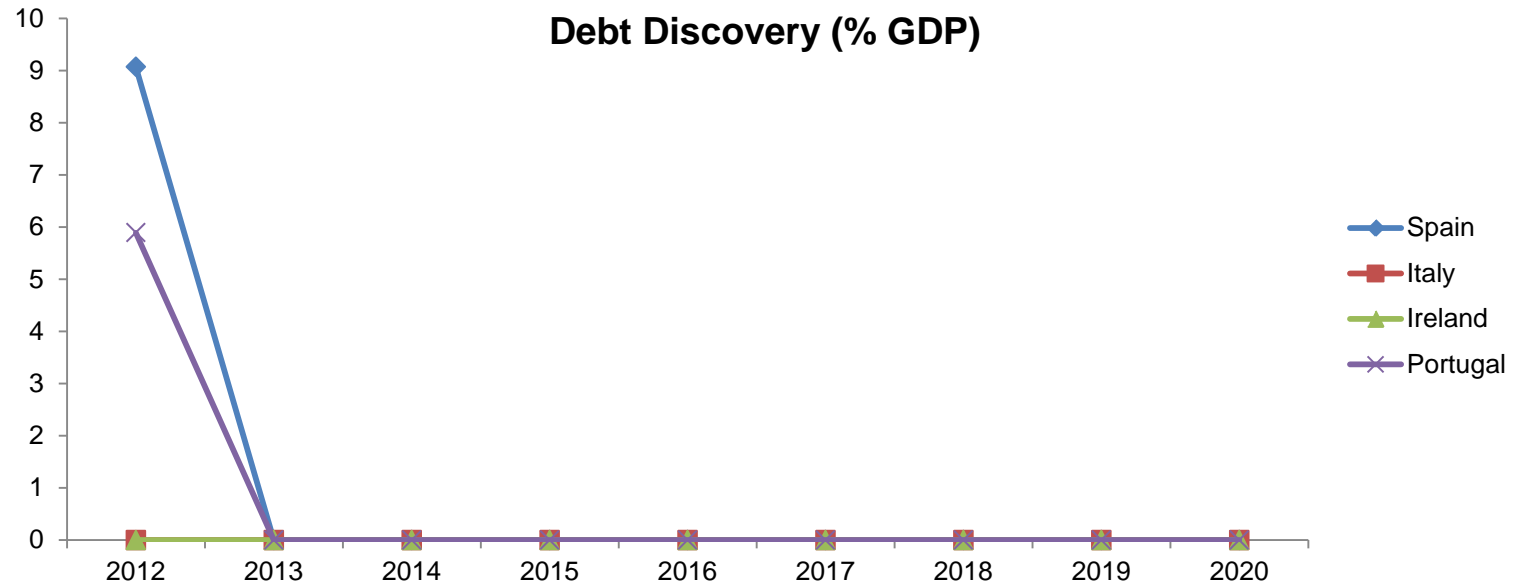
Baseline Interest Rate Benchmark and Sovereign Spreads, 2013-20

	2013	2014	2015	2016	2017	2018	2019	2020
10-year German Bund (percent)	1.9	2.5	3.6	3.7	3.7	3.7	3.7	3.7
Sovereign spreads (basis points)								
Ireland	350	300	275	225	225	200	175	175
Italy	350	300	275	225	225	200	175	175
Portugal	650	500	375	250	225	200	175	175
Spain	425	335	275	225	225	200	175	175

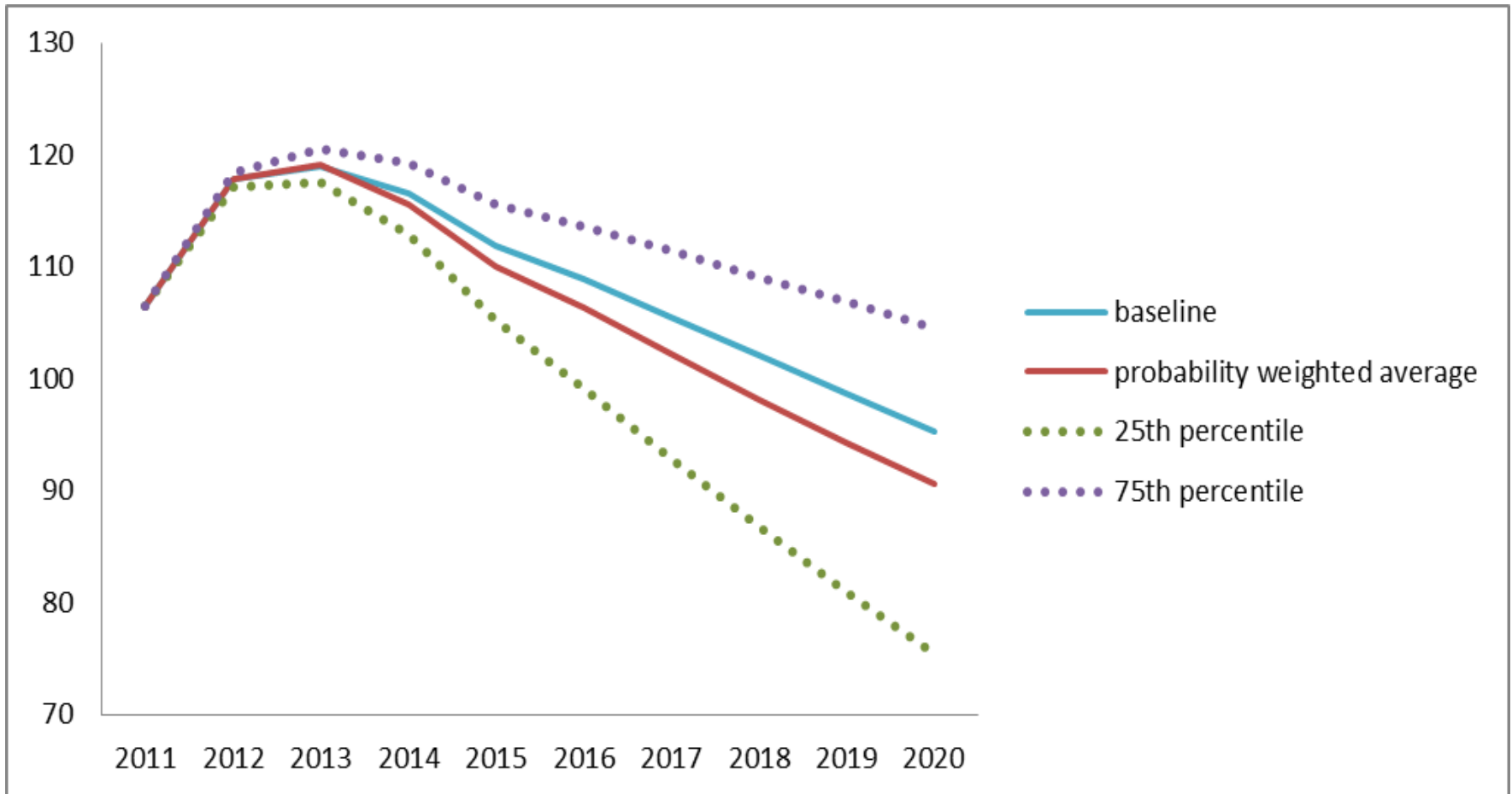
Baseline Scenarios



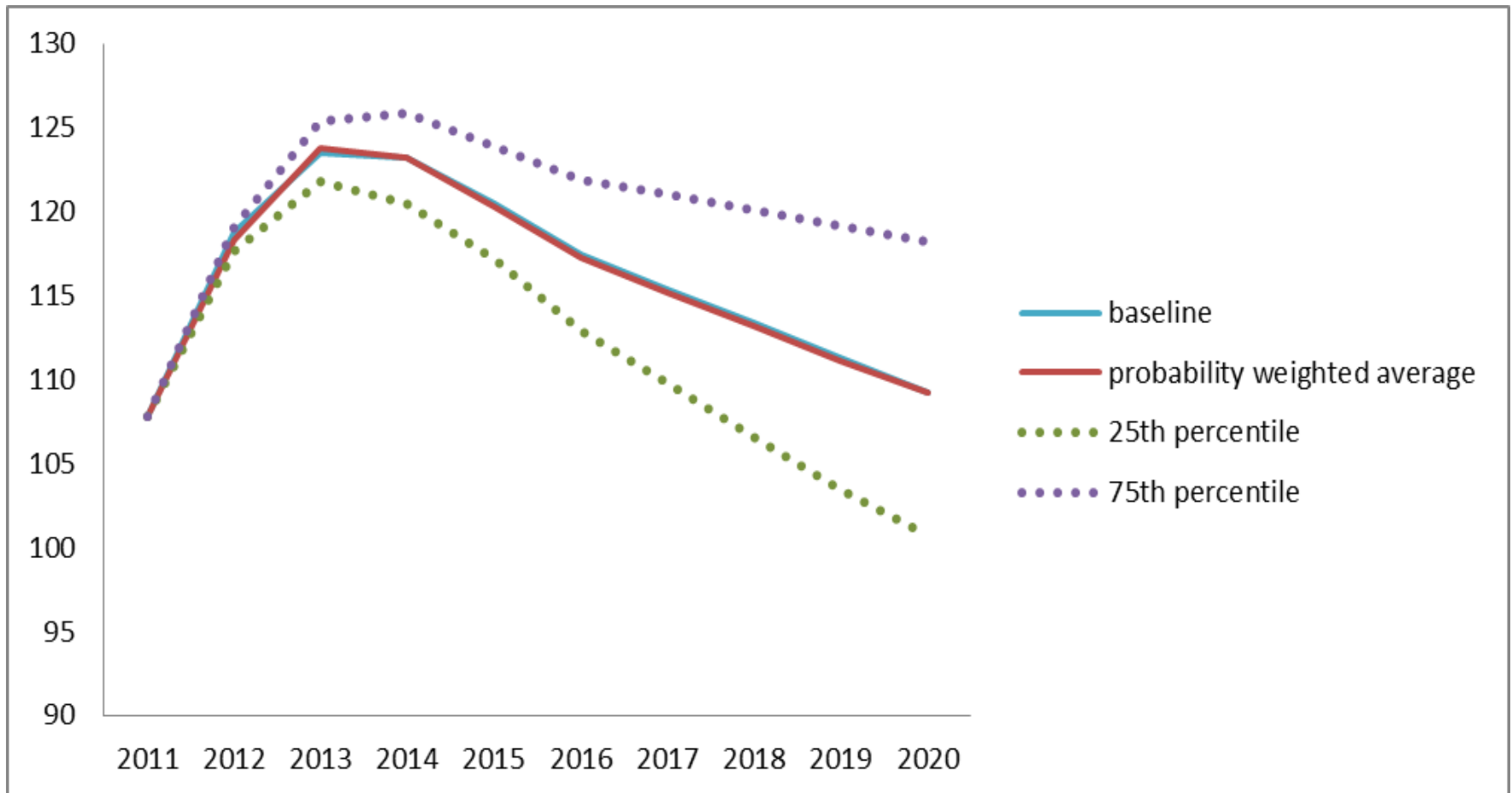
Baseline Scenarios cont.



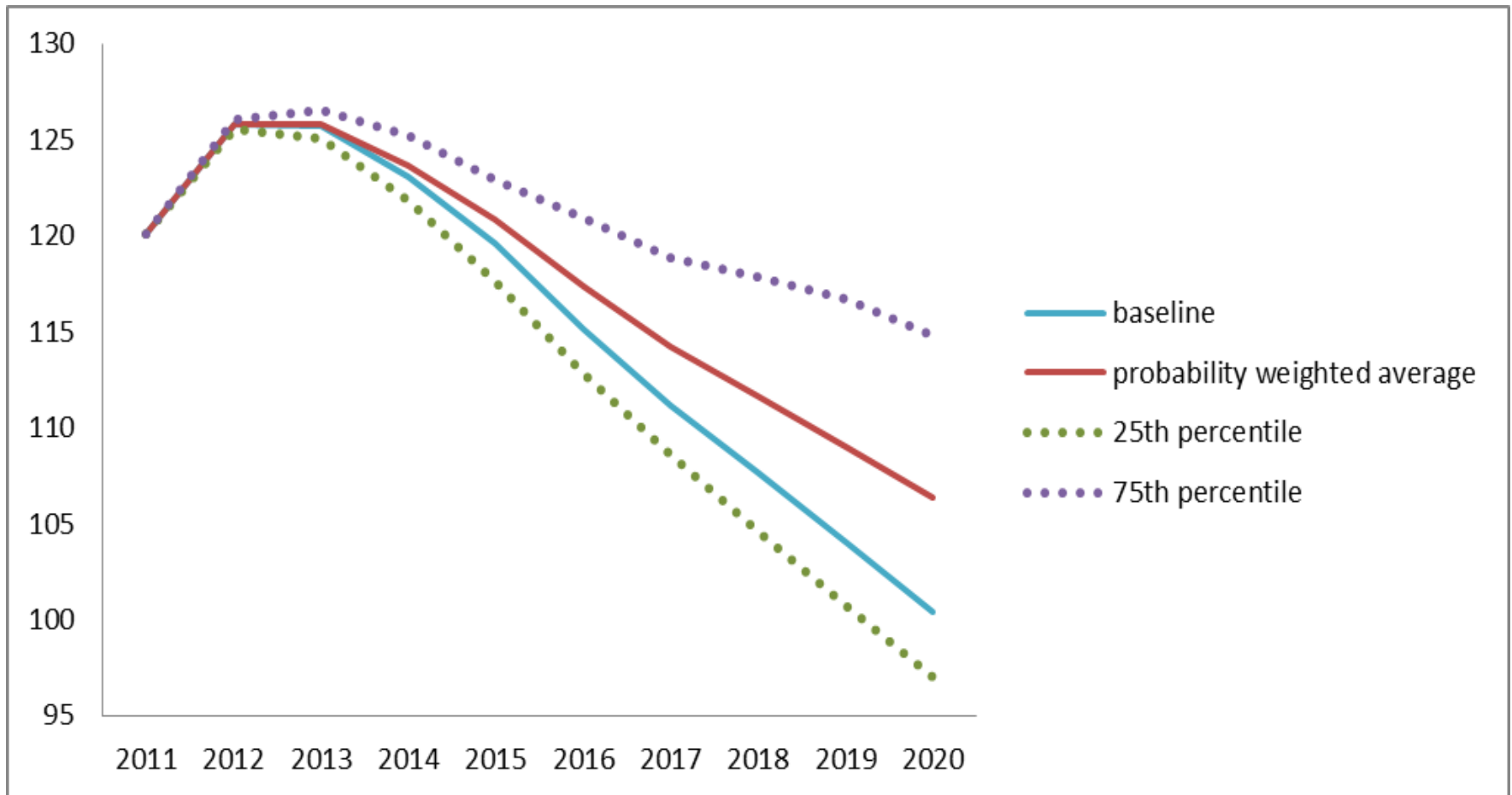
Ireland Debt/GDP %



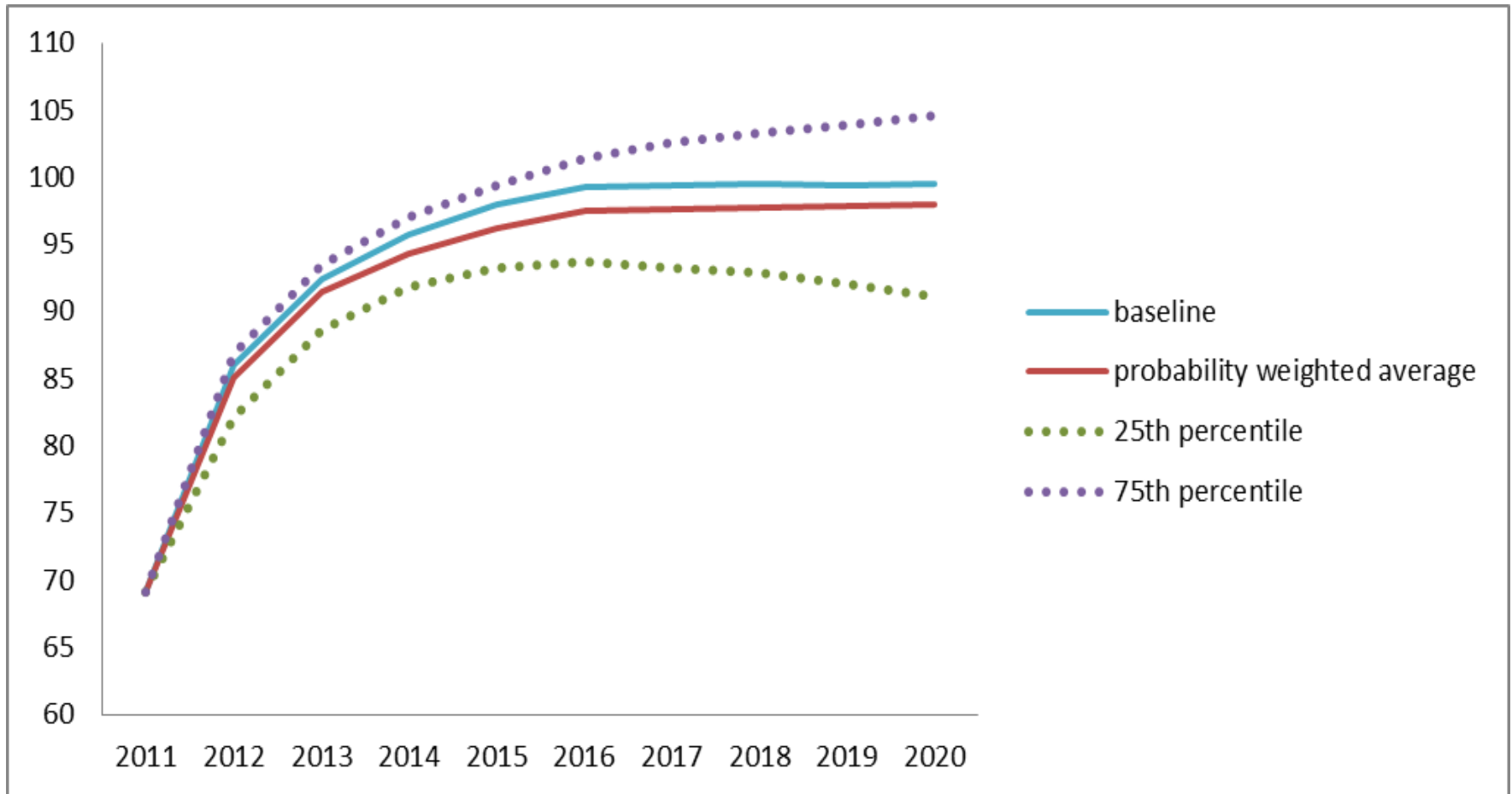
Portugal Debt/GDP %



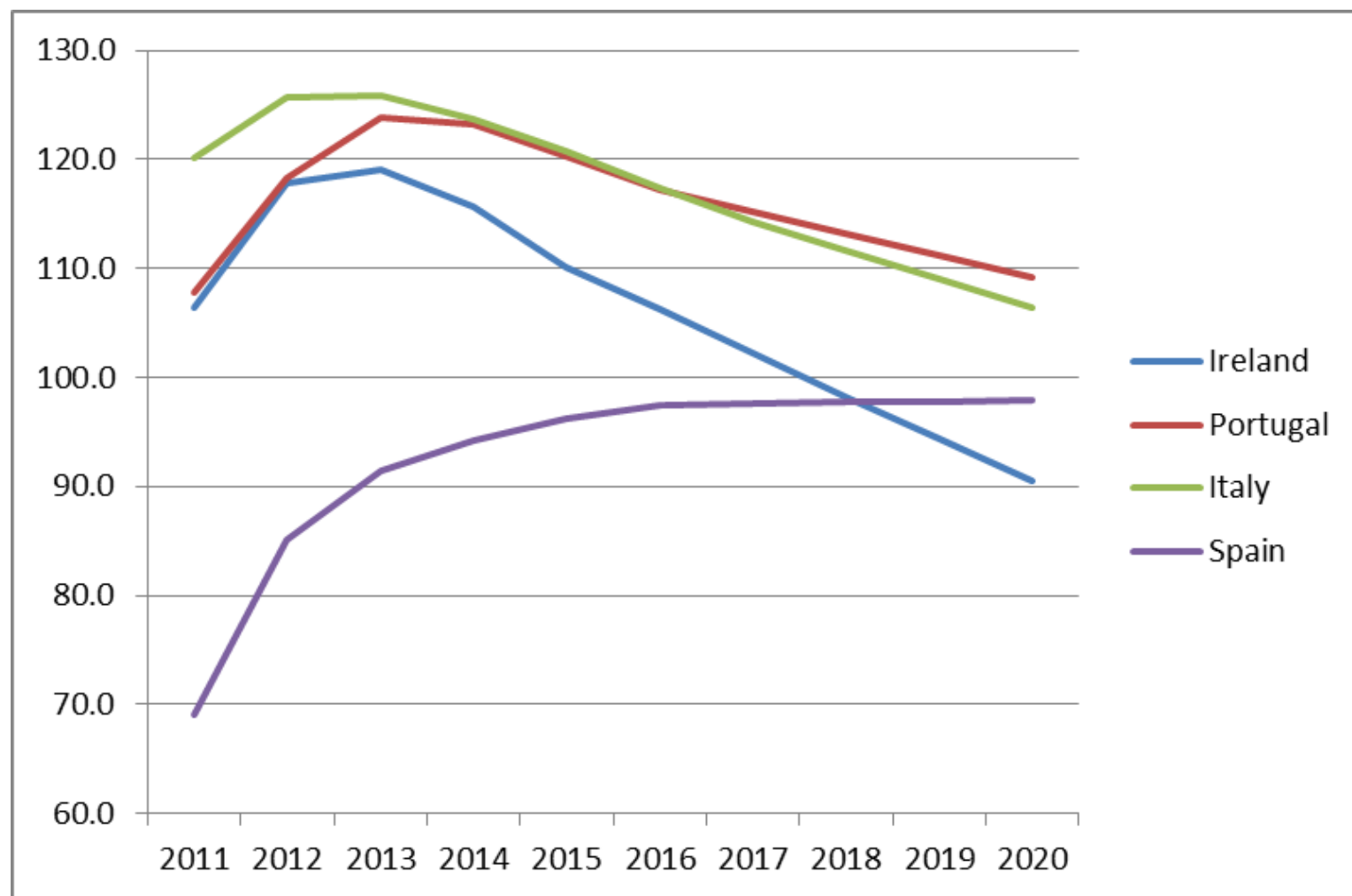
Italy Debt/GDP %



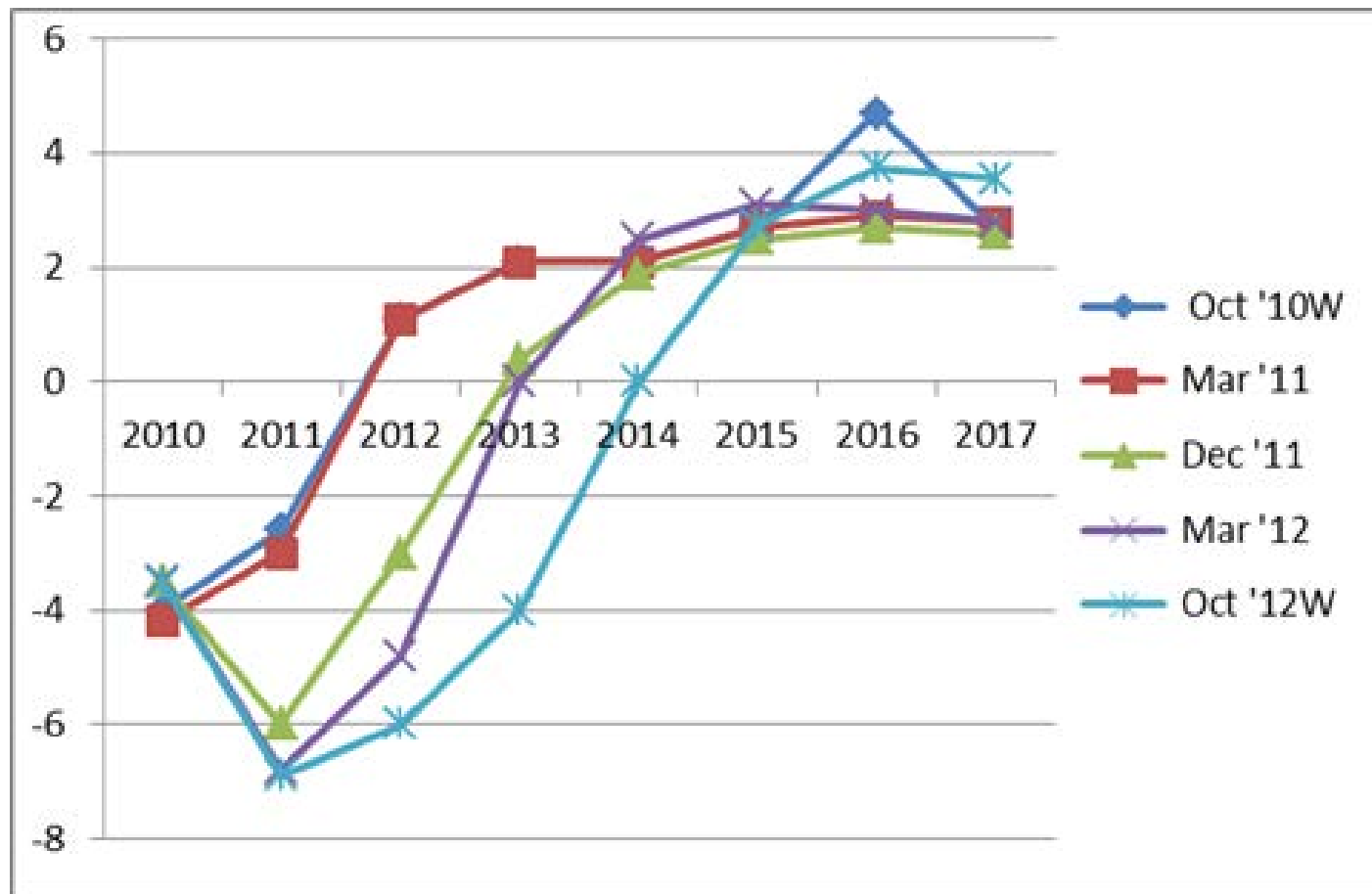
Spain Debt/GDP %



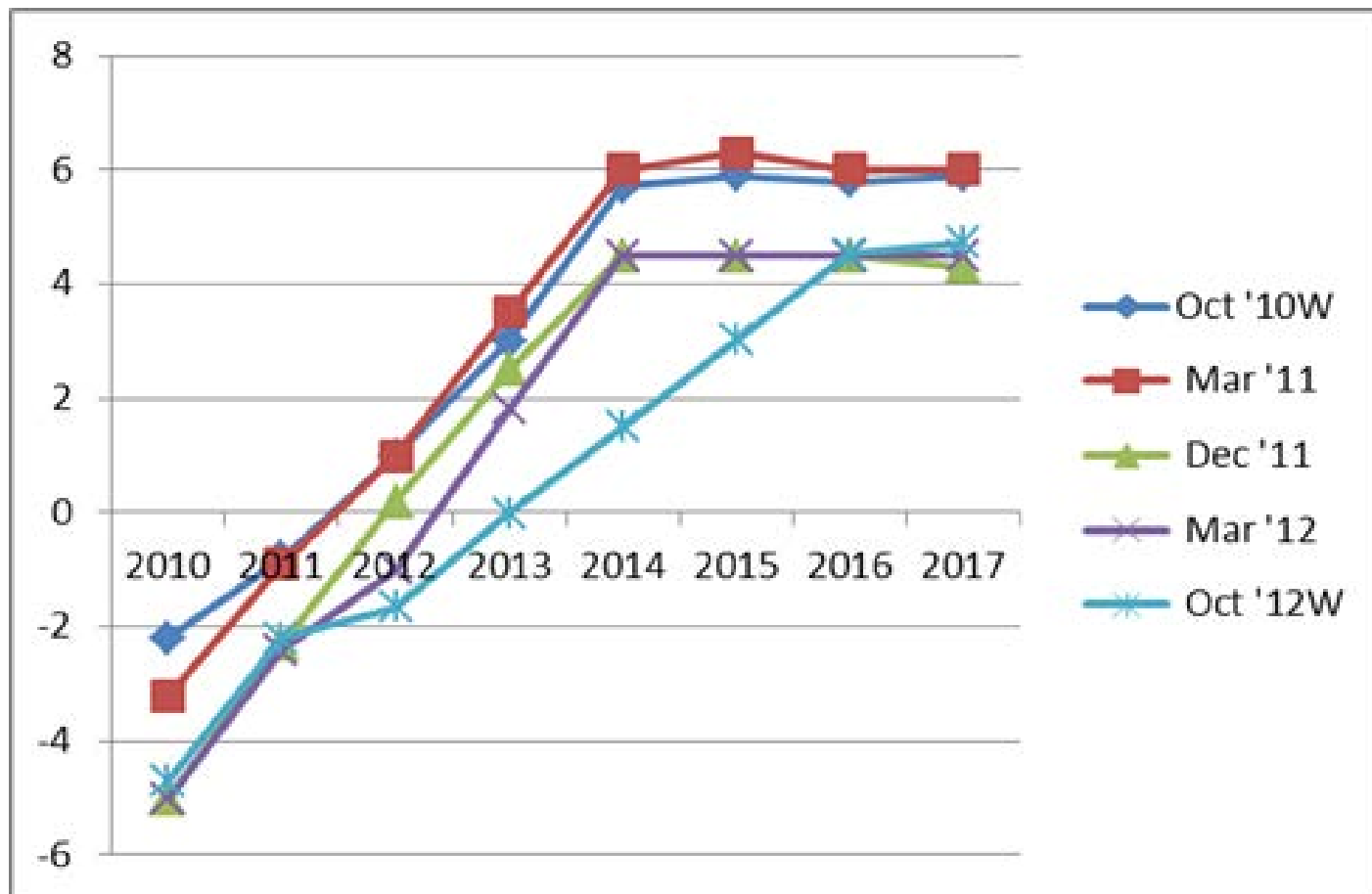
Debt/GDP Baselines, Four Countries (%)



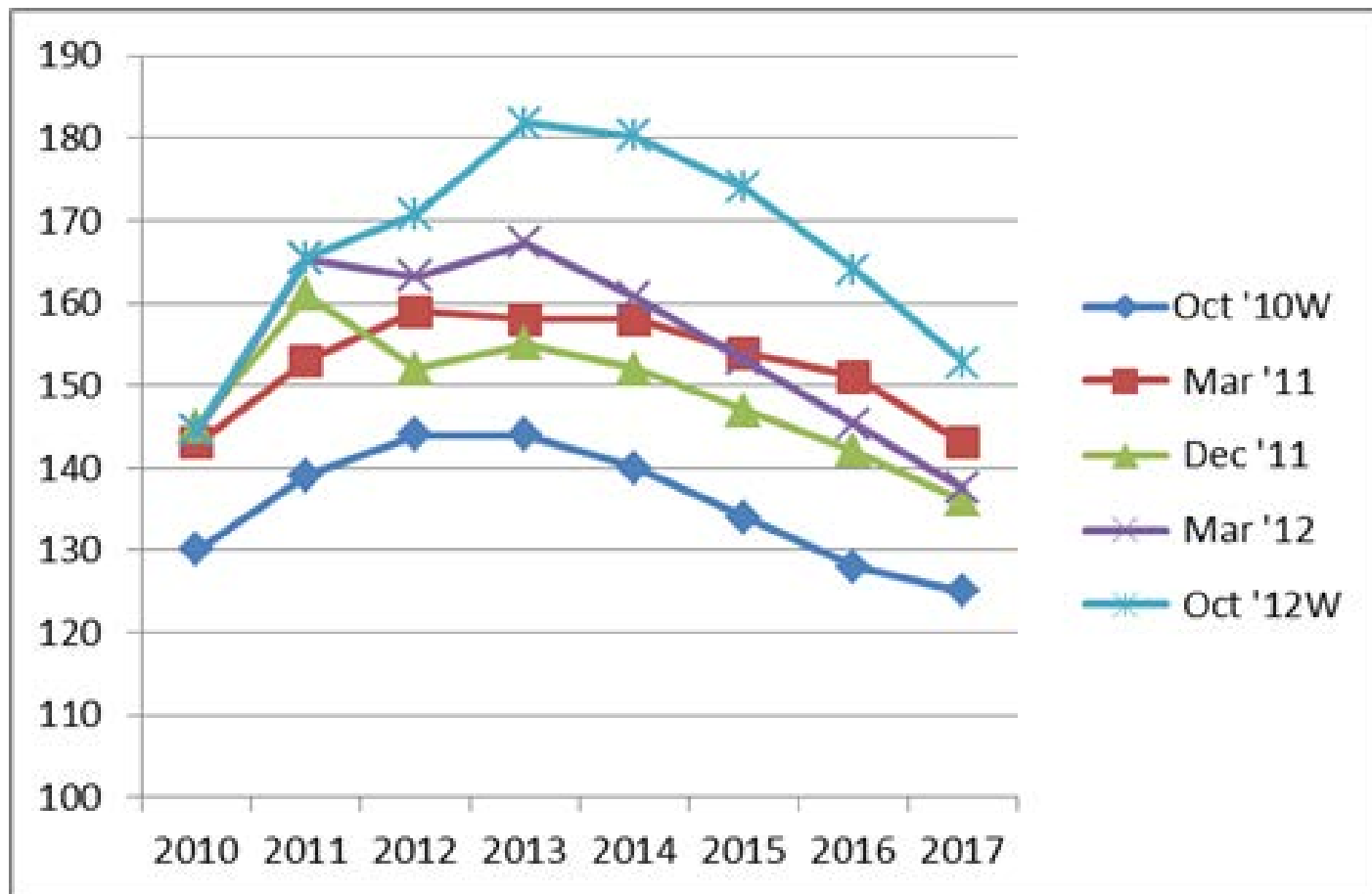
IMF Greece Projections – Growth (%)



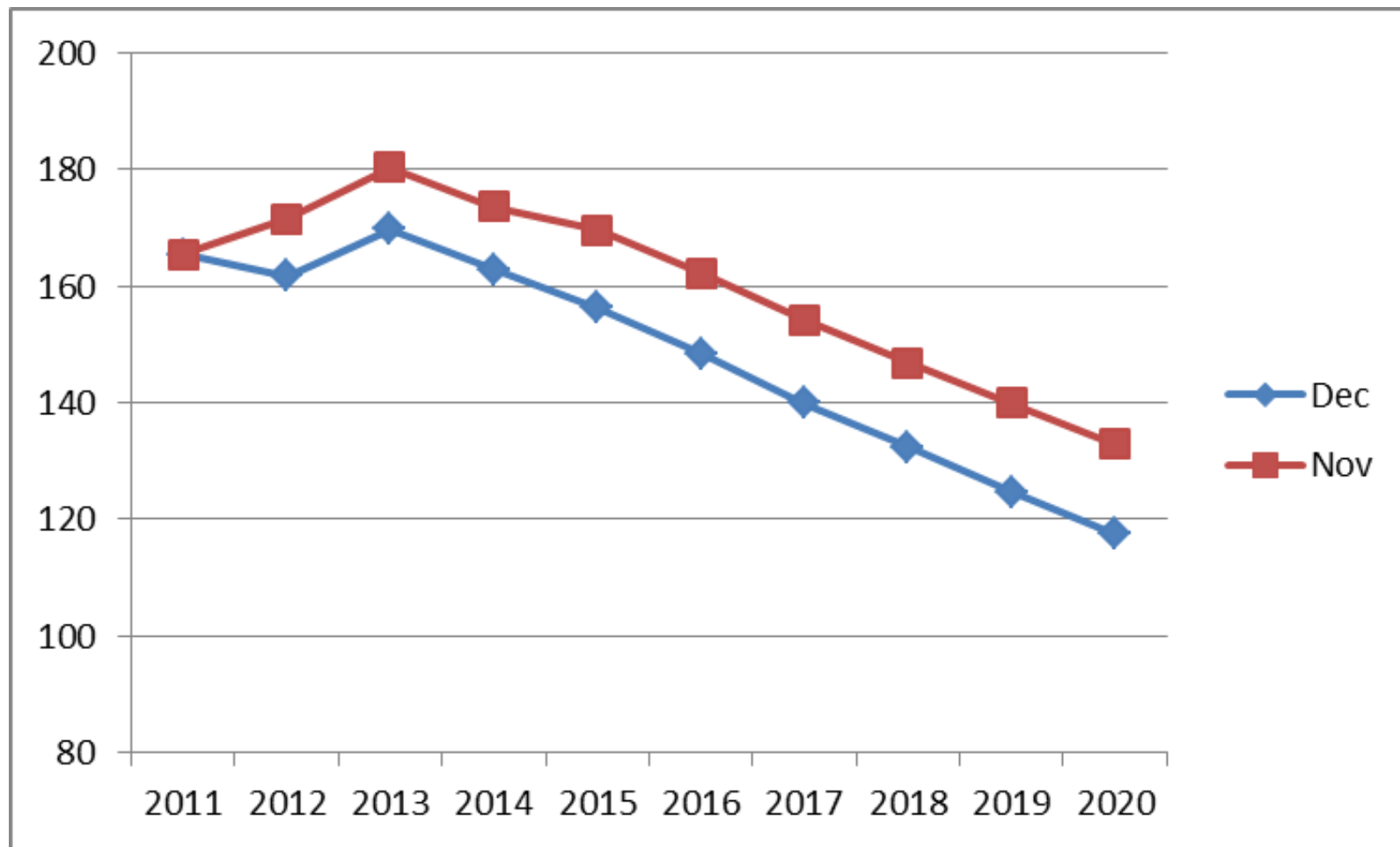
IMF Greece Projections – Primary Surplus (% GDP)



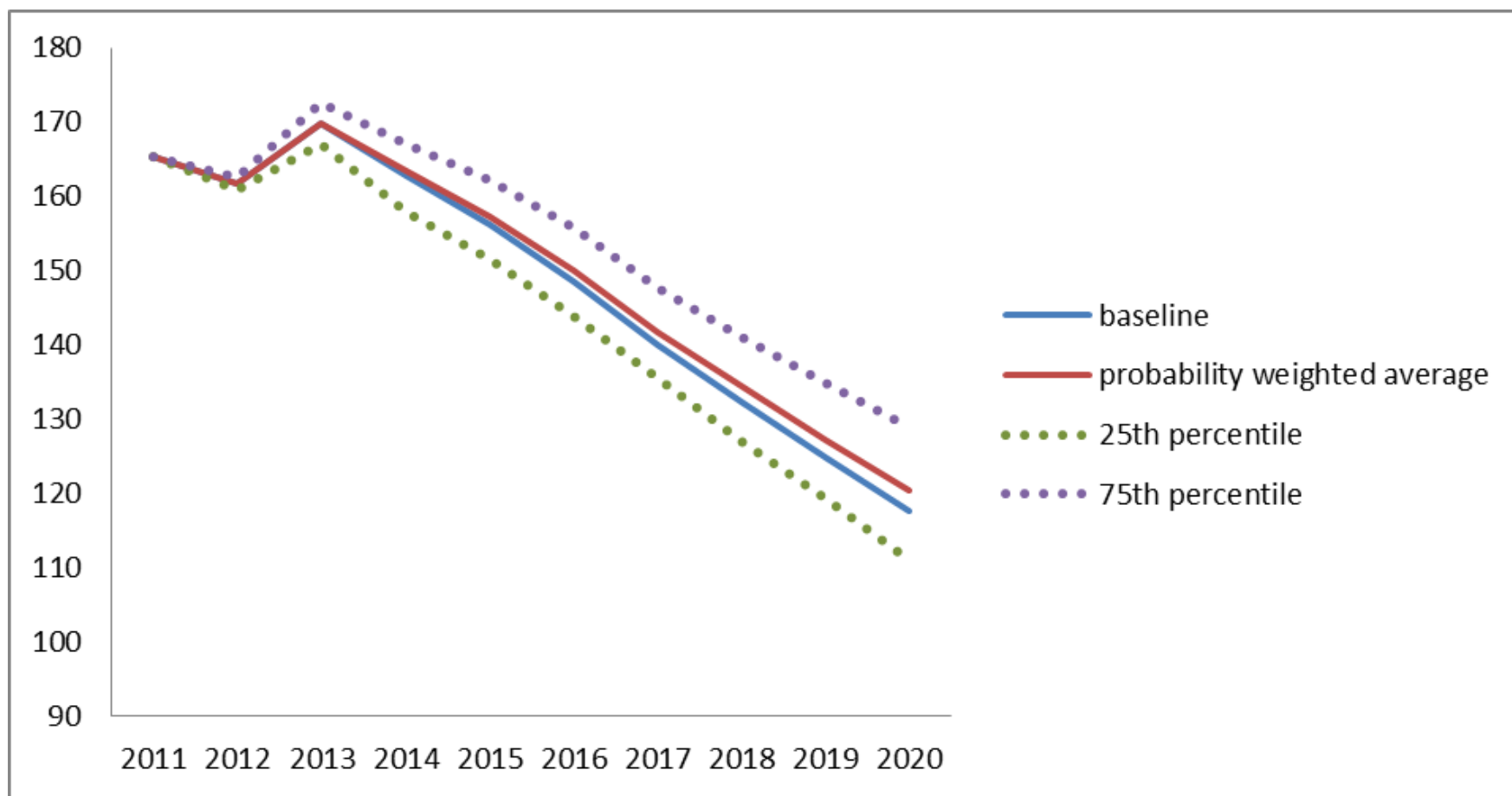
IMF Greece Projections – Debt/ GDP (%)



Baseline Greek Debt/ GDP (%) Before and After December Relief



Outlook for Greek Debt/GDP Ratio (%)





Ireland Scenarios

	2012	2013	2014	2015	2016	2017	2018	2019	2020
	Real GDP growth (%)								
1	-0.2	0.4	1.5	1.8	1.8	1.9	1.9	1.9	1.9
2	0.1	1.4	2.5	2.8	2.8	2.9	2.9	2.9	2.9
3	0.4	2.4	7.0	7.0	7.0	7.0	7.0	7.0	7.0
	Primary surplus (%GDP)								
1	-5.4	-3.2	-0.5	1.5	2.0	2.5	2.5	2.5	2.5
2	-4.4	-2.2	0.5	2.5	3.0	3.5	3.5	3.5	3.5
3	-3.4	-1.2	1.5	3.5	4.0	4.5	4.5	4.5	4.5
	Privatization (bn euros)								
1	0	0	0	0	0	0	0	0	0
2	0	1	1	1	0	0	0	0	0
3	0	1.5	2	1.5	0	0	0	0	0

Portugal Scenarios

	2012	2013	2014	2015	2016	2017	2018	2019	2020
	Real GDP growth (%)								
1	-3.2	-2.0	0.53	1.23	1.23	1.13	1.13	1.13	1.13
2	-3.0	-1.0	1.2	1.9	1.9	1.8	1.8	1.8	1.8
3	-2.8	0.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
	Primary surplus (%GDP)								
1	-1.7	-1.1	1.3	2.0	2.0	2.1	2.1	2.1	2.1
2	-0.7	-0.1	2.3	3.0	3.0	3.1	3.1	3.1	3.1
3	0.3	0.9	3.3	4.0	4.0	4.1	4.1	4.1	4.1
	Bank recapitalization and contingent debt recognition (bn euros)								
1	9.8	3.0	0	0	0	0	0	0	0
2	9.8	0.0	0	0	0	0	0	0	0
3	6.6	0	0	0	0	0	0	0	0
	Privatization (bn euros)								
1	2	0	0	0	0	0	0	0	0
2	2.1	2.0	0	0	0	0	0	0	0
3	2.1	2.3	0	0	0	0	0	0	0

Italy Scenarios

	2012	2013	2014	2015	2016	2017	2018	2019	2020
	Real GDP growth (%)								
1	-2.4	-1.2	0.0	0.7	0.9	0.9	0.9	0.9	0.9
2	-2.3	-0.7	0.5	1.2	1.4	1.4	1.4	1.4	1.4
3	-2.2	-0.4	1.25	1.64	1.64	1.64	1.64	1.64	1.64
	Primary surplus (%GDP)								
1	2.7	3.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
2	3.1	4.25	4.7	4.95	5.6	5	5	5	5
3	3.4	4.7	5.2	5.45	6.1	5.5	5.5	5.5	5.5
	Privatization (bn euros)								
1	0	0	0	0	0	0	0	0	0
2	0	10	10	10	10	10	0	0	0
3	0	20	20	20	20	20	0	0	0

Spain Scenarios

	2012	2013	2014	2015	2016	2017	2018	2019	2020
	Real GDP growth (%)								
1	-1.7	-1.9	0.3	0.9	1.0	1.1	1.1	1.1	1.1
2	-1.5	-1.4	1.0	1.6	1.7	1.7	1.7	1.7	1.7
3	-1.4	-1.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
	Primary surplus (%GDP)								
1	-5.0	-2.7	-1.3	-0.4	0.6	1.2	1.2	1.2	1.2
2	-4.5	-2.2	-0.8	0.1	1.1	1.7	1.7	1.7	1.7
3	-4.0	-1.7	-0.3	0.6	1.6	2.2	2.2	2.2	2.2
	Bank recapitalization and contingent debt recognition (bn euros)								
1	110	0	0	0	0	0	0	0	0
2	96	0	0	0	0	0	0	0	0
3	50	0	0	0	0	0	0	0	0
	Privatization (bn euros)								
1	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0
3	0	5	5	5	0	0	0	0	0

Greece Scenarios

	2012	2013	2014	2015	2016	2017	2018	2019	2020
	Real GDP growth (%)								
1	-7.0	-5.0	-1.0	1.8	2.8	2.6	2.6	2.6	2.6
2	-6.5	-4.0	0.0	2.8	3.8	3.6	3.6	3.6	3.6
3	-6.0	-3.0	3.9	3.9	3.9	3.9	3.9	3.9	3.9
	Primary surplus (%GDP)								
1	-2.7	-1.0	0.5	2.0	3.0	3.0	3.0	3.0	3.0
2	-1.7	0.0	1.5	3.0	4.5	4.5	4.5	4.3	4.3
3	-0.7	1.0	2.5	4.0	5.5	5.7	5.7	5.7	5.7
	Bank recapitalization and contingent debt recognition (billions €)								
1	60.7	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	55.7	2.0	-4.5	-0.1	-0.2	-0.2	-0.2	0.0	0.0
3	27.9	0.0	-4.5	-0.1	-0.2	-0.2	-0.2	0.0	0.0
	Privatization (billions €)								
1	2.3	3.2	3.3	4.6	4.8	5.1	4.1	4.3	4.5
2	3.3	4.2	4.3	5.6	5.8	6.1	5.1	5.3	5.5
3	4.3	5.2	5.3	6.6	6.8	7.1	6.1	6.3	6.5