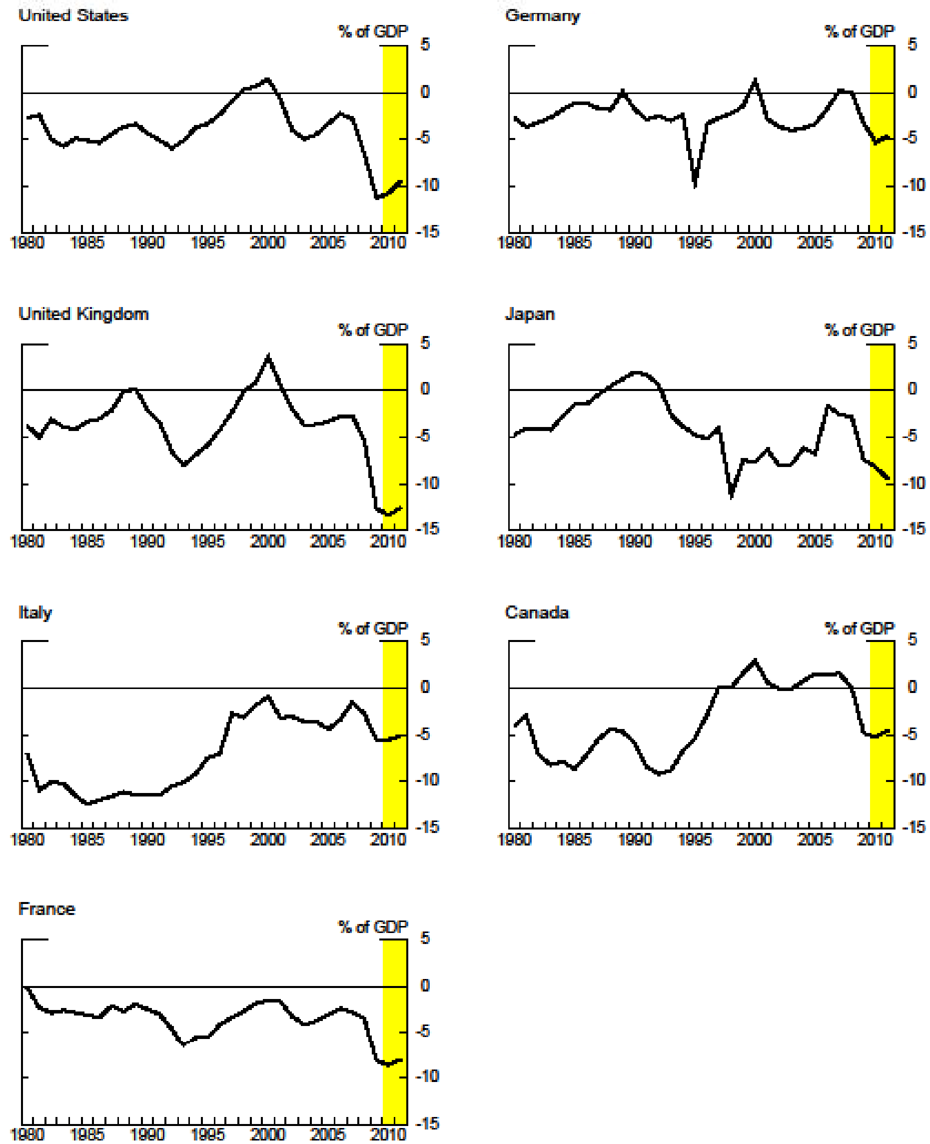
“Fiscal Positions and Government Bond Yields in the OECD”

Joseph Gruber and Steve Kamin
Federal Reserve Board
April 29, 2011

05-07-10

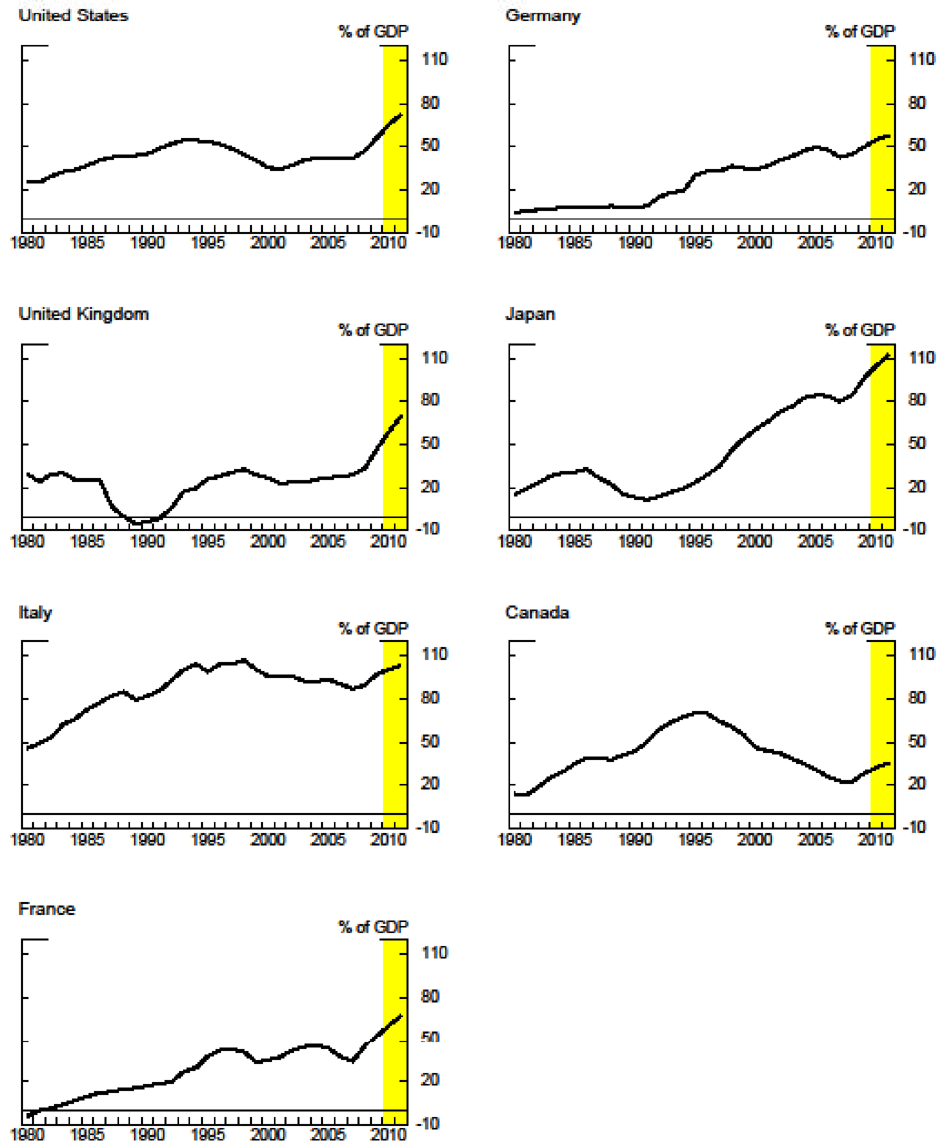
Fiscal Balances for G-7 Countries



*OECD Economic Outlook December 2009

05-07-10

Government Net Debt for G-7 Countries



*OECD Economic Outlook December 2009

Key Question:

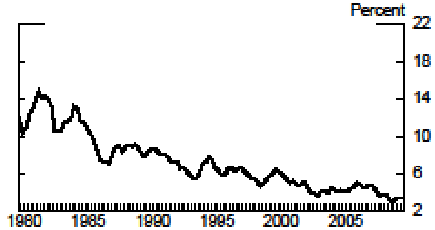
- Fiscal positions have deteriorated. What is the likely impact on bond yields?

Fiscal Positions and Interest Rates

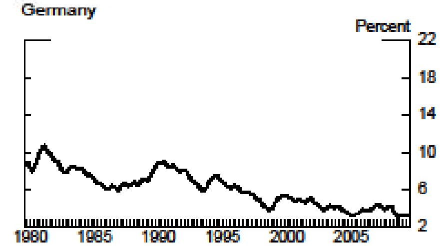
- A number of channels link fiscal positions and interest rates.
  - Crowding out.
  - Portfolio Balance.
  - Default Risk.
  - Inflation Expectations – Debt Monetization.

Long-term Interest Rates for G-7 Countries

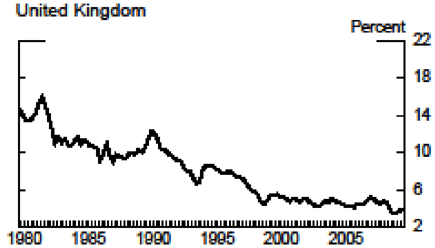
United States



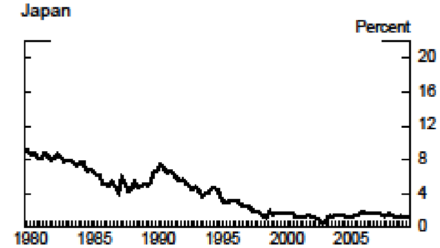
Germany



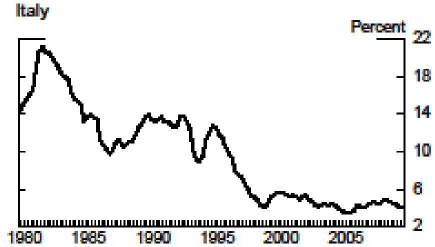
United Kingdom



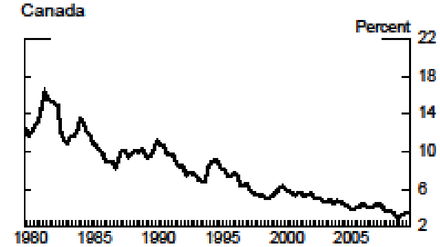
Japan



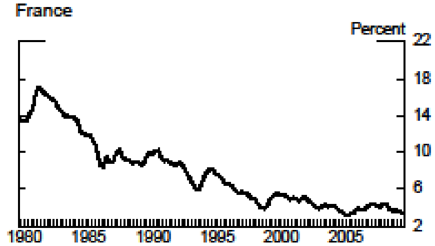
Italy



Canada



France



*OECD Economic Outlook December 2009

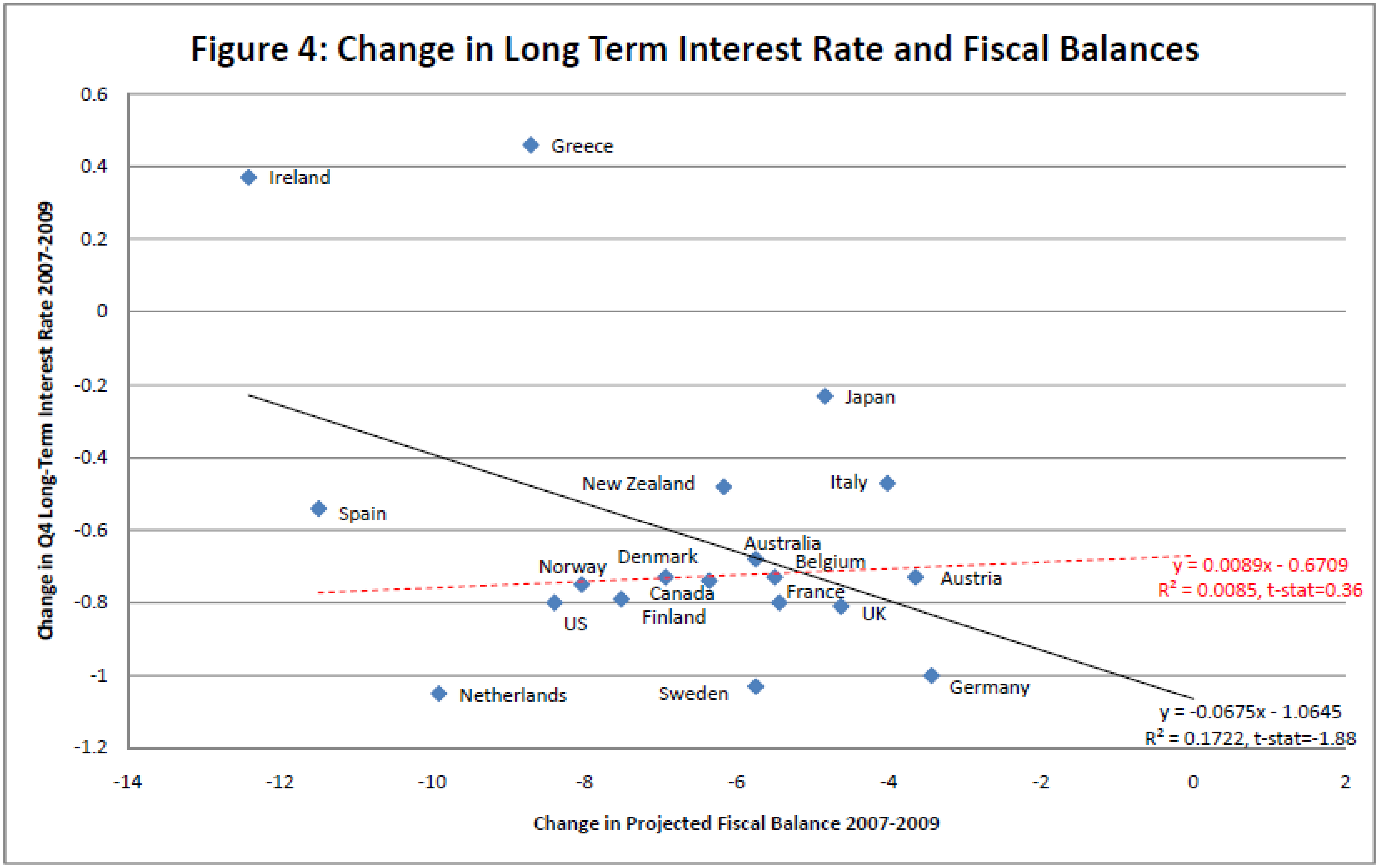


Figure 4: Change in Long Term Interest Rate and Fiscal Balances
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
Change in Q4 Long-Term Interest Rate 2007-2009
Greece
Ireland
Japan
New Zealand
Italy
Spain
Australia
Denmark
Belgium
Norway
Austria
Canada
France
UK
US
Finland
Netherlands
Sweden
Germany
y = 0.0089x - 0.6709
R² = 0.0085, t-stat=0.36
y = -0.0675x - 1.0645
R² = 0.1722, t-stat=-1.88
-14
-12
-10
-8
-6
-4
-2
0
2
Change in Projected Fiscal Balance 2007-2009

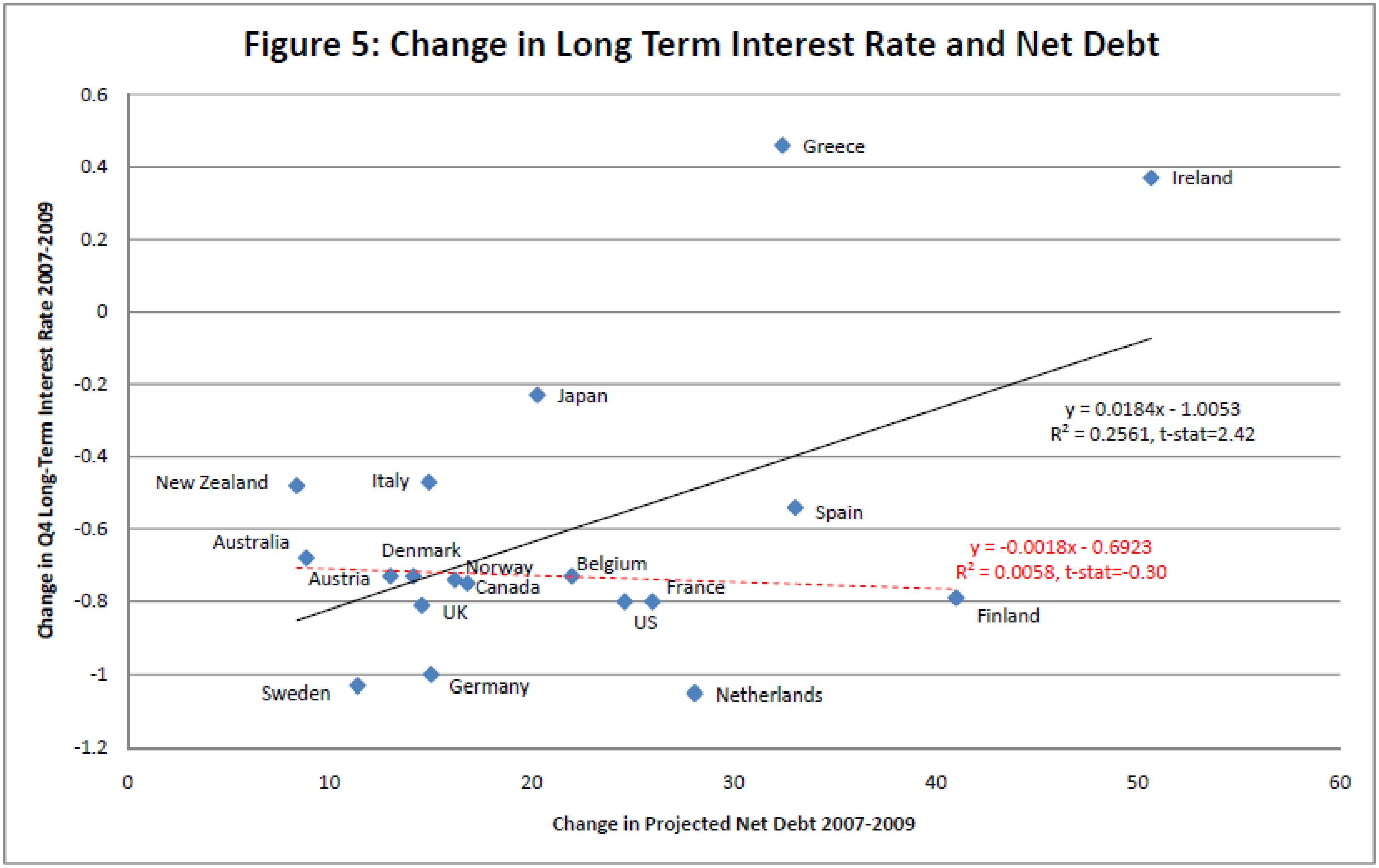


Figure 5: Change in Long Term Interest Rate and Net Debt
Change in Q4 Long-Term Interest Rate 2007-2009
Change in Projected Net Debt 2007-2009
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
0
10
20
30
40
50
60
Greece
Ireland
Japan
New Zealand
Italy
Spain
Australia
Denmark
Norway
Belgium
Austria
Canada
France
UK
US
Finland
Sweden
Germany
Netherlands
y = 0.0184x - 1.0053
R² = 0.2561, t-stat=2.42
y = -0.0018x - 0.6923
R² = 0.0058, t-stat=-0.30

Issues in Estimation

- Problem is that both fiscal policy and interest rates are endogenous to the cycle.
  - Fall in GDP leads to lower fiscal balances and lower interest rates resulting in positive empirical relationship that obscures negative impact.

Recent Lit.

- Laubach (2009):
  - Examine 5-year ahead fiscal projections and interest rates.
  - Beyond the cycle – avoid endogenity.
- ECB Studies:
  - Nickel, Rother, and Rülke (2009) and Attinasi, Checherita, and Nickel (2009)
  - Examine spreads between countries subject to similar macro shocks.

Our research:

- Similar to Laubach,
  - Utilize two-year ahead forecasts of fiscal variables in order to avoid endogenity.
- but different:
  - Using full panel data set of OECD countries.
  - Allows us to examine additional factors (spillovers).
- Use coefficients to provide up-to-date estimates of impact of fiscal deterioration on sovereign yields

Our Approach:

- Dependent Variable: 10-year sovereign bond yield.
  - Long-term yields less correlated with the cycle.
- Fiscal Variables
  - Two-year ahead fiscal balances and net debt from OECD Economic Outlooks.
  - Example: 2007 Q4 Interest rate vs. Dec. 2007 Economic Outlook projection for 2009 balance.

Control Variables

- Addition Controls for the Cycle:
  - Short-Term Interest Rates.
  - GDP growth and Inflation.
    - Two-Year ahead forecasts from OECD.
    - Forecasts might hold more information for 10-year rates than current values.
- Lagged Long-term Rates
  - Persistence in interest rates.

Our Methodology

- Annual Panel Regressions (1988-2006)
- Samples:
  - OECD – 19 Countries.
  - G-7.
- Fixed Period Effects.
  - Savings Glut
- Fixed Country Effects.
  - Institutional arrangements, i.e. pension regulation. Creditworthiness.

Table 1: Baseline Regressions

	Full Panel				G-7 Countries			
	1	2	3	4	5	6	7	8
Short-term IR	**0.314**	**0.317**	**0.237**	**0.276**	**0.325**	**0.317**	**0.337**	**0.314**
	11.015	9.938	5.663	8.145	5.849	6.047	5.150	4.058
Long-term IR(lag)	**0.379**	**0.365**	**0.445**	**0.305**	**0.369**	**0.338**	**0.379**	**0.257**
	8.233	7.244	7.767	7.025	3.582	3.293	3.616	2.922
GDP	**0.091**	**0.104**	**0.086**	**0.110**	**0.285**	**0.268**	**0.320**	**0.231**
	1.683	1.690	1.666	2.059	2.873	2.865	2.918	2.755
Inflation	**0.210**	**0.237**	**0.184**	**0.197**	**0.210**	**0.237**	**0.253**	**0.326**
	3.422	3.545	2.879	3.065	2.098	2.253	1.937	3.460
Gross Debt	**0.004**				**0.010**			
	2.436				3.142			
Net Debt		**0.004**				**0.012**		
		2.135				3.376		
Primary Balance			**-0.035**				**-0.108**	
			-2.119				-2.328	
Structural Balance				**-0.055**				**-0.112**
				-2.430				-2.462
#Obs	347	319	344	276	140	140	133	105
R^2	0.975	0.975	0.968	0.965	0.973	0.974	0.972	0.971
SER	0.449	0.447	0.457	0.348	0.494	0.486	0.498	0.379

First 4 columns represent entire sample. Second 4 columns represent G7 countries only.
Interest rate variables are contemporaneous. All other variables are 2-year ahead forecasts.
Panel regression with unreported constant as well as period and cross-sectional fixed effects.
19 cross-sections and 20 periods (1988 - 2007).
t-statistic reported underneath coefficient
Bold indicates signifance at the 10 percent level.
G7 includes Canada, France, Germany, Italy, Japan, United States and United Kingdom

Comparison to Previous Studies

- Laubach (2009):
  - 1 percentage point increase in fiscal deficit/GDP boosts U.S. 5-year forward yield 20-29 basis points
  - 1 percentage point increase in fiscal debt/GDP boosts forward yield 3-4 bp

- We find in long-run, using G7 results:
  - 1 p.p. increase in fiscal deficit : 17 bp
  - 1 p.p. increase in fiscal debt : 2 bp

Robustness Checks

- Current rather than Forecasted variables.
  - Significant impacts although smaller than with forecasted variables.
  - Prospective fiscal policy more important for long-term rates than current policy (although the two are clearly correlated).

Table 2: Contemporaneous Independent Variables

	Full Panel				G-7 Countries			
	1	2	3	4	5	6	7	8
Short-term IR	**0.310**	**0.322**	**0.231**	**0.287**	**0.283**	**0.287**	**0.293**	**0.265**
	10.005	9.688	5.600	8.156	4.741	4.807	4.445	3.296
Long-term IR(lag)	**0.417**	**0.416**	**0.496**	**0.308**	**0.463**	**0.456**	**0.495**	**0.377**
	7.737	6.996	7.982	6.179	3.986	3.927	4.327	3.431
GDP	-0.006	-0.005	-0.022	0.000	-0.040	-0.035	0.014	0.018
	-0.221	-0.154	-1.253	-0.021	-0.779	-0.736	0.309	0.399
Inflation	0.028	0.026	**0.046**	**0.055**	0.049	0.049	**0.093**	**0.137**
	1.335	1.164	2.061	2.259	1.521	1.564	2.288	2.829
Gross Debt	0.001				0.003			
	0.585				1.223			
Net Debt		0.002				**0.005**		
		0.875				1.793		
Primary Balance			-0.022				**-0.077**	
			-1.545				-2.448	
Structural Balance				**-0.061**				**-0.078**
				-3.350				-2.501
#Obs	347	319	344	276	140	140	133	105
R^2	0.973	0.973	0.971	0.965	0.970	0.970	0.970	0.967
SER	0.466	0.470	0.466	0.351	0.525	0.523	0.513	0.406

First 4 columns represent entire sample. Second 4 columns represent G7 countries only.
All variables are contemporaneous
Panel regression with unreported constant as well as period and cross-sectional fixed effects.
19 cross-sections and 20 periods (1988 - 2007).
t-statistic reported underneath coefficient
Bold indicates signifance at the 10 percent level.
G7 includes Canada, France, Germany, Italy, Japan, United States and United Kingdom

Robustness Checks

- 5-year ahead 5-year rate (Laubach's)
  - Remove the front end of the curve – Focus on the less cyclical.
  - Same size effects – But not significant.

Table 3: 5-year 5-year Forward Interest Rates

	G-5 Countries 10-year Rate				G-5 Countries Forward Rate			
	1	2	3	4	5	6	7	8
Short-term IR	**0.238**	**0.235**	**0.224**	**0.187**	0.048	0.040	0.080	0.100
	5.567	5.726	4.804	3.526	0.907	0.792	1.526	1.074
Long-term IR(lag)	**0.383**	**0.361**	**0.379**	**0.464**	**0.560**	**0.540**	**0.621**	**0.513**
	5.160	4.900	4.747	4.265	5.845	5.588	5.659	4.100
GDP	**0.174**	**0.162**	**0.159**	**0.107**	0.122	0.116	0.169	**0.251**
	3.215	3.080	2.718	1.747	1.284	1.290	1.577	1.741
Inflation	0.063	0.083	0.040	**0.184**	0.112	0.127	0.126	0.069
	1.105	1.375	0.692	2.682	1.206	1.385	1.310	0.454
Gross Debt	**0.005**				0.005			
	2.947				1.517			
Net Debt		**0.006**				0.006		
		3.040				1.564		
Primary Balance			-0.028				-0.060	
			-1.428				-1.472	
Structural Balance				**-0.069**				-0.083
				-2.234				-1.538
#Obs	95	95	90	70	95	95	90	70
R^2	0.989	0.989	0.988	0.984	0.957	0.958	0.959	0.949
SER	0.291	0.289	0.299	0.281	0.510	0.508	0.500	0.515

Interest rate variables are contemporaneous. All other variables are 2-year ahead forecasts.
Panel regression with unreported constant as well as period and cross-sectional fixed effects.
5 cross-sections and 19 periods (1988 - 2006).
t-statistic reported underneath coefficient
Bold indicates signifance at the 10 percent level.
G5 include Canada, Germany, Japan, United States and United Kingdom

Robustness Check

- Inflation may be endogenous to fiscal policy.
  - Including inflation may induce a downward bias in the estimated impact of fiscal policy.
- Removing inflation does not significantly change the results.
  - Suggests changing inflation expectations not the relevant channel.

Table 4: Removing Inflation

	Full Panel				G-7 Countries			
	1	2	3	4	5	6	7	8
Short-term IR	**0.321**	**0.331**	**0.233**	**0.285**	**0.345**	**0.339**	**0.350**	**0.343**
	10.133	9.191	5.216	7.666	5.650	5.786	4.893	3.842
Long-term IR(lag)	**0.395**	**0.394**	**0.476**	**0.301**	**0.394**	**0.373**	**0.418**	**0.270**
	7.949	6.970	7.748	6.699	3.638	3.414	3.809	2.856
GDP	0.059	0.075	0.081	**0.109**	**0.249**	**0.224**	**0.267**	**0.242**
	1.031	1.161	1.551	1.964	2.650	2.535	2.481	2.857
Inflation								
Gross Debt	0.002				**0.009**			
	1.330				3.023			
Net Debt		0.002				**0.011**		
		1.261				3.125		
Primary Balance			-0.024				**-0.092**	
			-1.575				-2.003	
Structural Balance				**-0.047**				**-0.095**
				-2.106				-2.235
#Obs	347	319	344	276	140	140	133	105
R^2	0.973	0.973	0.970	0.964	0.972	0.972	0.970	0.968
SER	0.465	0.468	0.470	0.356	0.506	0.501	0.514	0.402

First 4 columns represent entire sample. Second 4 columns represent G7 countries only.
Interest rate variables are contemporaneous. All other variables are 2-year ahead forecasts.
Panel regression with unreported constant as well as period and cross-sectional fixed effects.
19 cross-sections and 20 periods (1988 - 2007).
t-statistic reported underneath coefficient
Bold indicates signifance at the 10 percent level.
G7 includes Canada, France, Germany, Italy, Japan, United States and United Kingdom

Table 5: Projected Inflation as Dependent Variable

	Full Panel				G-7 Countries			
	1	2	3	4	5	6	7	8
Short-term IR	0.047	0.054	**0.047**	**0.063**	**0.098**	**0.100**	**0.091**	0.060
	1.431	1.476	1.699	2.327	2.583	2.623	2.348	1.120
Inflation (lag)	**0.348**	**0.352**	**0.680**	**0.473**	**0.370**	**0.366**	**0.356**	**0.355**
	4.485	4.141	8.238	6.638	2.902	2.883	2.768	3.240
GDP	-0.044	-0.005	0.046	0.031	-0.063	-0.071	-0.097	0.057
	-0.560	-0.056	0.608	0.435	-0.488	-0.558	-0.781	0.490
Gross Debt	**-0.005**				-0.001			
	-2.226				-0.207			
Net Debt		**-0.004**				-0.002		
		-1.977				-0.636		
Primary Balance			-0.009				0.032	
			-0.270				1.015	
Structural Balance				-0.020				0.028
				-0.907				1.055
#Obs	334	305	353	281	133	133	133	105
R^2	0.805	0.802	0.866	0.848	0.880	0.880	0.881	0.857
SER	0.569	0.545	0.653	0.409	0.518	0.517	0.515	0.391

First 4 columns represent entire sample. Second 4 columns represent G7 countries only.
Interest rate variables are contemporaneous. All other variables are 2-year ahead forecasts.
Panel regression with unreported constant as well as period and cross-sectional fixed effects.
19 cross-sections and 19 periods (1989 - 2007).
t-statistic reported underneath coefficient
Bold indicates signifance at the 10 percent level.
G7 includes Canada, France, Germany, Italy, Japan, United States and United Kingdom

Spillovers

Table 10: Impact of the Debts and Deficits of Others

	Full Panel				G-7 Countries			
	1	2	3	4	5	6	7	8
Short-term IR	**0.387**	**0.375**	**0.328**	**0.488**	**0.388**	**0.361**	**0.380**	**0.512**
	11.665	9.867	8.215	9.863	6.919	6.420	6.518	6.372
Long-term IR(lag)	**0.339**	**0.304**	**0.378**	**0.150**	**0.339**	**0.326**	**0.331**	**0.155**
	9.431	7.516	9.687	3.387	5.672	5.344	5.603	2.156
GDP	**0.389**	**0.402**	**0.330**	**0.544**	**0.602**	**0.573**	**0.585**	**0.608**
	4.230	4.236	3.793	5.742	3.943	3.868	4.096	4.313
Inflation	**0.406**	**0.403**	**0.394**	**0.351**	**0.328**	**0.359**	**0.322**	**0.309**
	5.163	4.907	4.792	3.174	2.541	2.758	2.320	1.890
Gross Debt	**0.011**				**0.012**			
	3.104				2.634			
Net Debt		**0.010**				**0.013**		
		3.170				2.554		
Primary Balance			**-0.075**				**-0.117**	
			-2.862				-3.025	
Structural Balance				**-0.125**				**-0.167**
				-3.325				-3.333
Foreign Gross	-0.003				-0.006			
	-0.491				-0.581			
Foreign Net		**-0.018**				-0.015		
		-1.778				-1.044		
Foreign Primary			**0.107**				**0.087**	
			3.018				1.766	
Foreign Structural				**-0.546**				**-0.482**
				-6.943				-5.001
#Obs	347	319	344	276	140	140	133	105
R^2	0.920	0.920	0.904	0.859	0.929	0.931	0.925	0.907
SER	0.777	0.779	0.822	0.684	0.745	0.738	0.759	0.635

Table 12: Marginal Impact of Fiscal Variables

Country	Change in Net Debt (% of GDP)* 2007-2015	Change in Structural Balance (% of GDP)* 2007-2015	Estimated Change in Bond Yields: Net Debt & Structural Balance Model
			(Effects are measured in basis points)
Canada	9	-0.8	16
France	25	1.3	-5
Germany	12	-1.2	22
Italy	12	-0.6	12
Japan	72	-4.8	90
UK	38	1.4	2
US	42	-3.4	62

*Source: October 2010 World Economic Outlook

Conclusions

- Deficits and Debt increase long-term rates.
- Caveats:
  - Not a good estimate of sovereign risk.
- Extensions:
  - Substitute corporate rates to check crowding out.
  - Control for external vs. internal debt holding.