WHAT IS A CRISIS? EFFICIENTLY MEASURING REAL-TIME PERCEPTIONS OF FINANCIAL MARKET STRESS WITH AN APPLICATION TO FINANCIAL CRISIS BUDGET CYCLES

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A PROJECT IN TWO PARTS

Part 1: create a new text-based **indicator of perceived financial market stress**.

Part 2: examine **politicians' fiscal responses** to stress given that they face **electoral constraints**.

PROBLEMS MEASURING FINANCIAL MARKET STRESS

STATUS QUO

Current banking crisis research relies on data from **Reinhart and Rogoff** (2009, 2010) and **Laeven and Valencia** (2013, and their predecessors).

ISSUES

- Created **post hoc**:
  - Selection bias, as excludes ‘successful’ policy responses.
  - Doesn’t necessarily represent how policy-makers **perceived** their problems.
- **Binary**, so no indication of intensity, especially over time.
- Often **ad hoc** determination of crisis conclusion.

ORDINAL TEXT-BASED MEASURE

Romer and Romer (2015) attempt to overcome some of these issues by:

- hand-coding,
- OECD bi-annual *Economic Outlook* reports,
- on a 16-point scale of credit intermediation stress.

Romer & Romer limitations

- Laborious and expensive to construct.
- Issues of reproducibility and Inter-coder reliability.
- Limited to the OECD.

QUANTITATIVE MEASURES

- **Z-Scores/CAMELS**: aggregate bank-level accounting data.
  - Widely used in finance.
- **Jing et al. (2015)**: use short-term interest rates and CB reserves.
  - Not widely used or available.
  - Conflates policy responses with economic conditions.
- **Rosas (2009)**: dynamic latent trait model
  - Not widely used or available.
  - Based on nationally reported data to the IFS, but reporting likely endogenous.

WE NEED

We need an indicator that is:

- based on detailed **contemporaneous** information, representing **perceptions** of financial market stress,
- **continuous**,
- **efficiently** machine-coded.

ESTIMATING FINANCIAL MARKET STRESS

DETAILED DATA

Economist Intelligence Unit (EIU) monthly country reports are:

- **comparable** (from 2003) for 180+ countries,
- **contemporaneous**.

TEXT SELECTION

EIU reports contain information about more than banking market conditions. So ...

Selected portions of texts based on keywords such as: `balance sheet`, `bank`, `credit`, and `finance`.

Results: 12,377 texts.

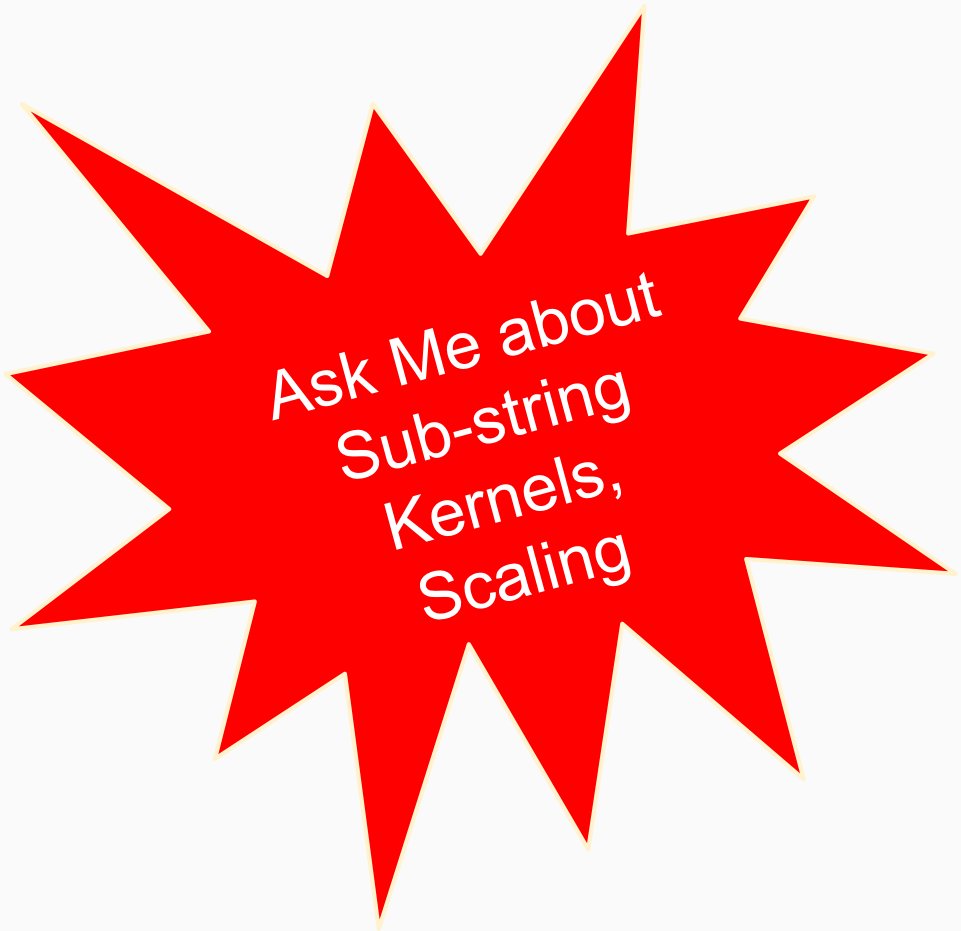
MACHINE SUMMARIZATION

Use kernel principal component analysis (PCA) to summarise the texts on a **more–less stressed scale**.

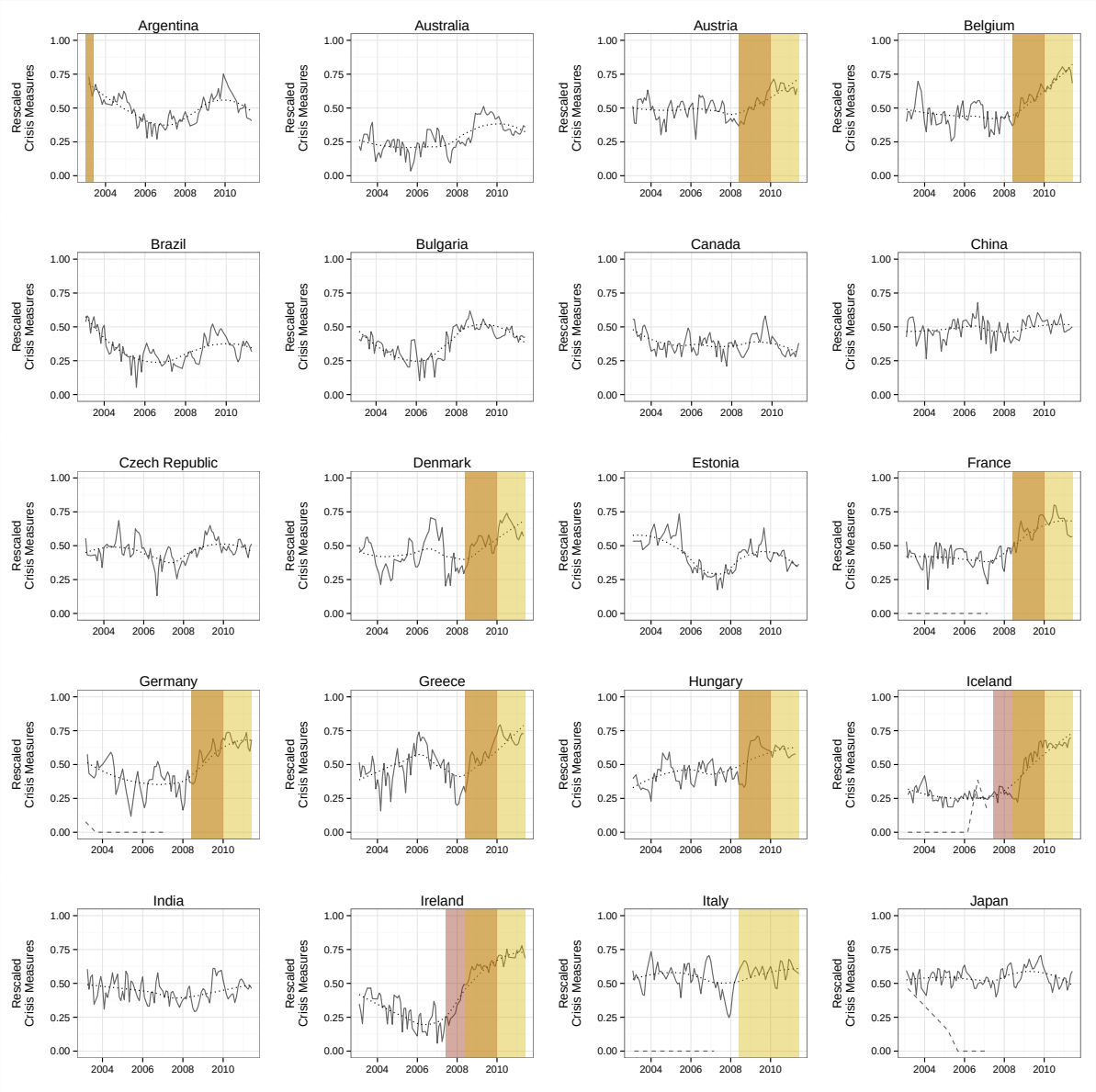
- Allows us to **preserve word order**, so that phrases like ‘expand credit’ and ‘slow credit’ distinguishable.

- Kernel PCA introduced into political science by Spirling (2012).

Ask about estimation details



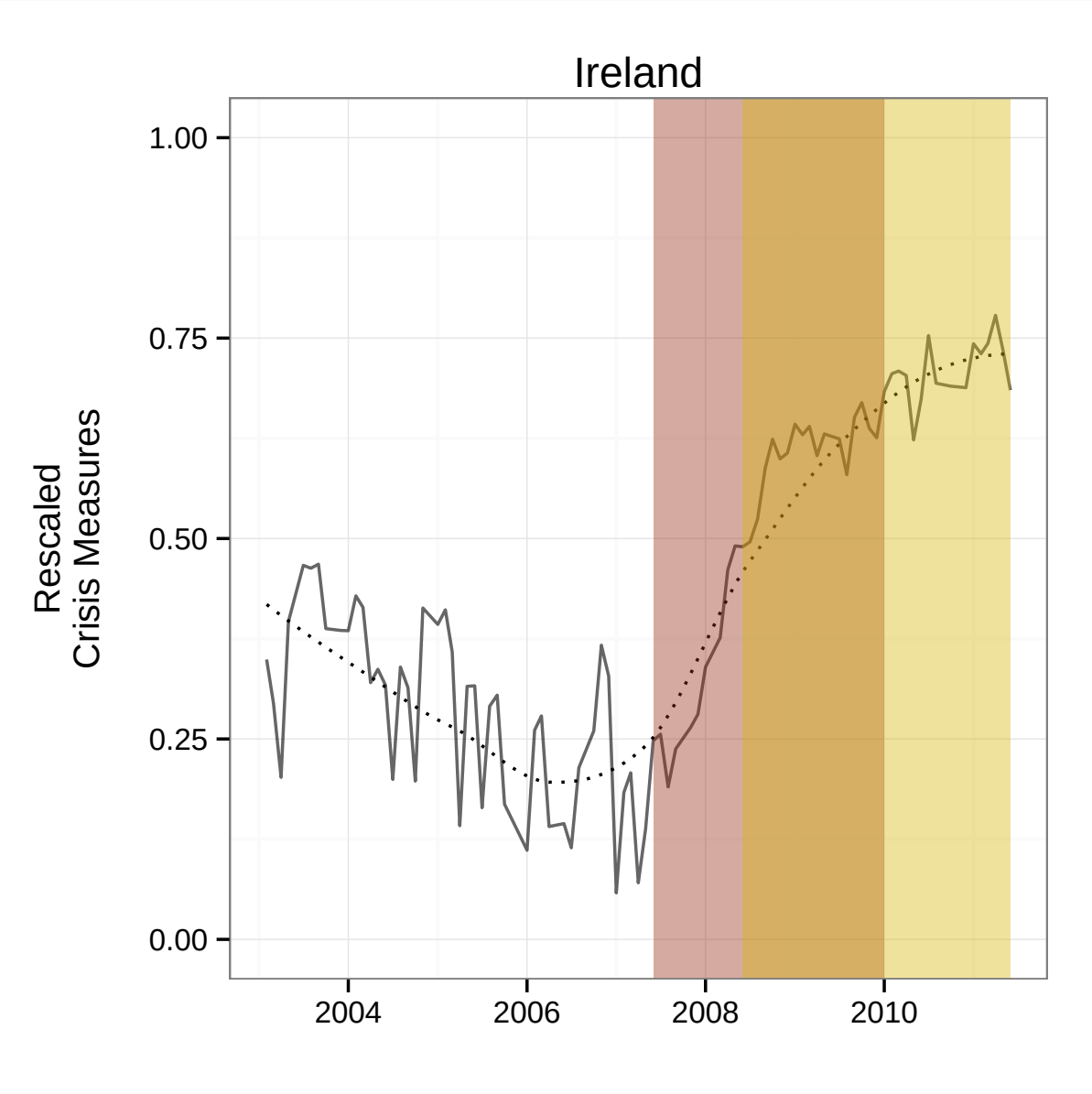
FINSTRESS (SELECTION)



FINSTRESS COMPARED TO PREVIOUS MEASURES

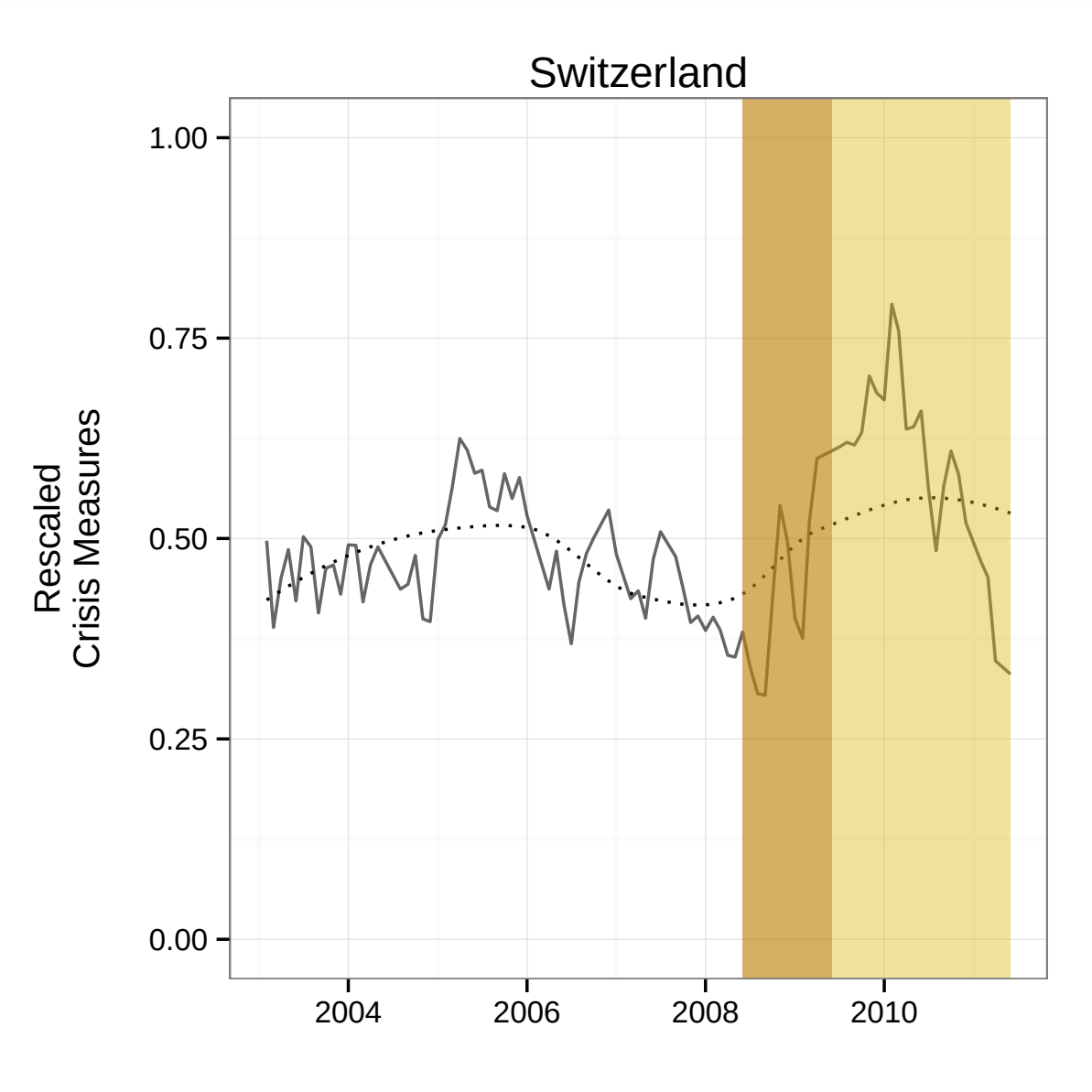
Similar, but different.

Corresponds to priors based on binary crisis variables.

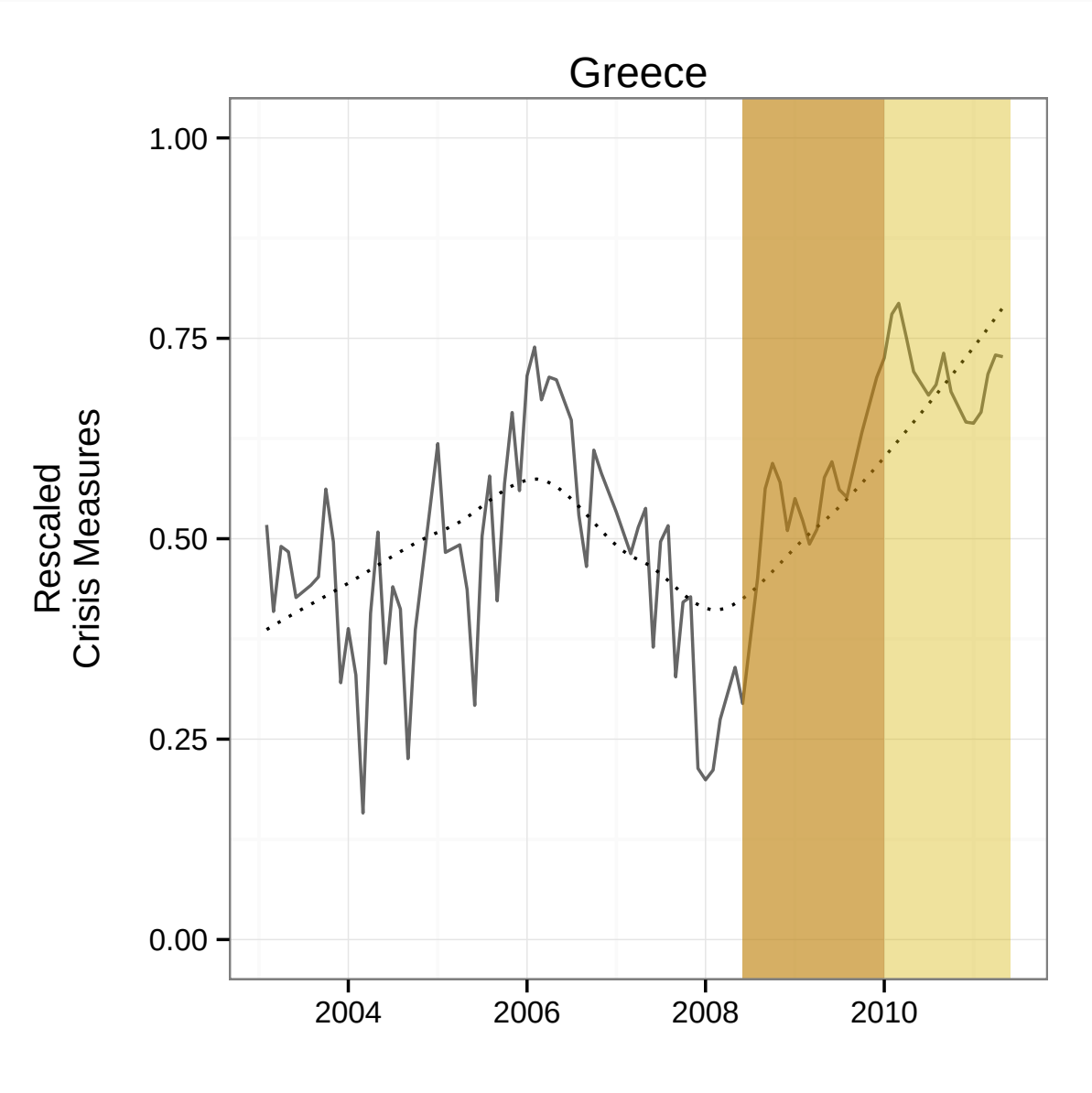

Ireland
Rescaled
Crisis Measures
1.00
0.75
0.50
0.25
0.00
2004
2006
2008
2010

But…

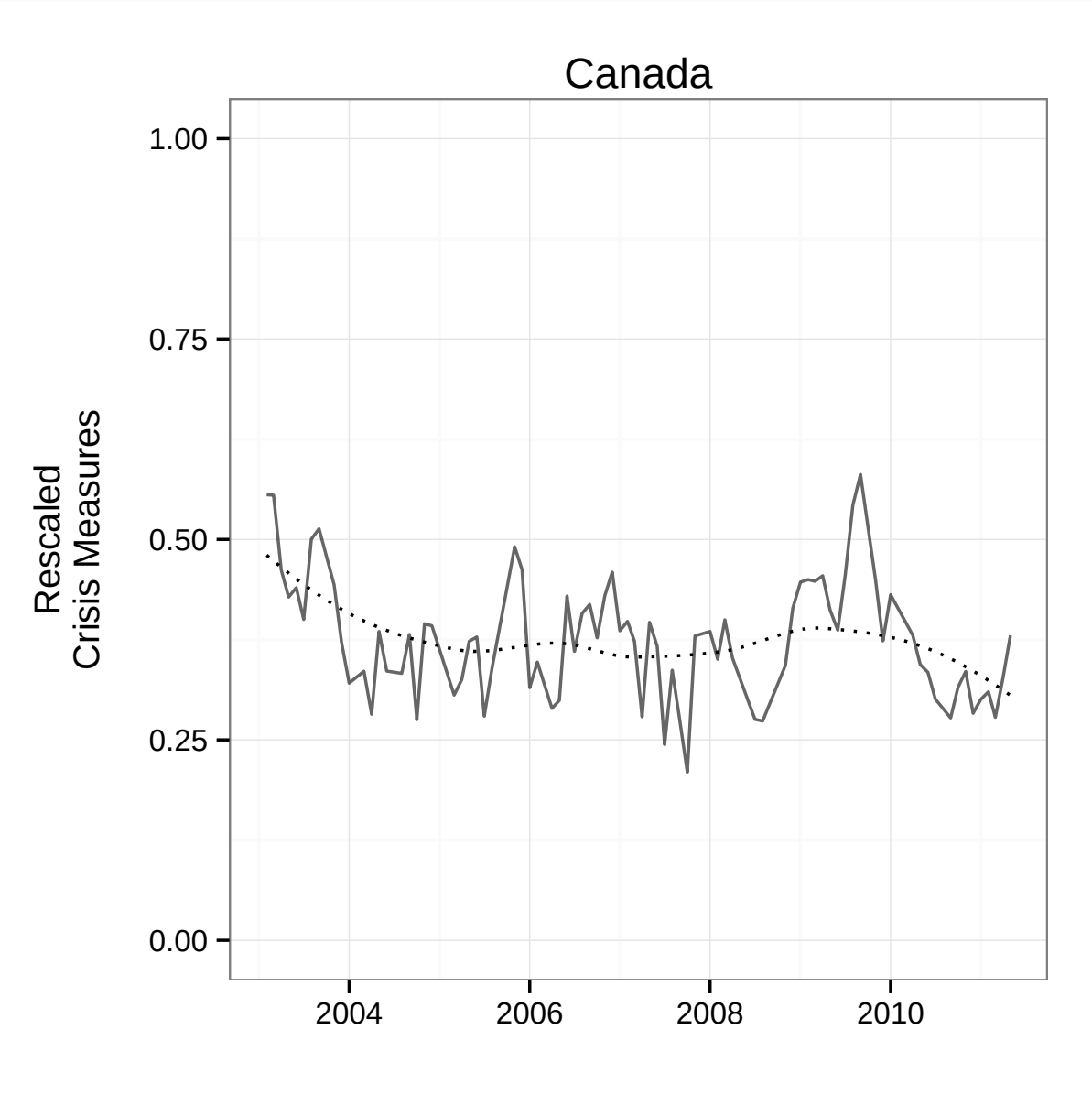
More **nuanced timing**.



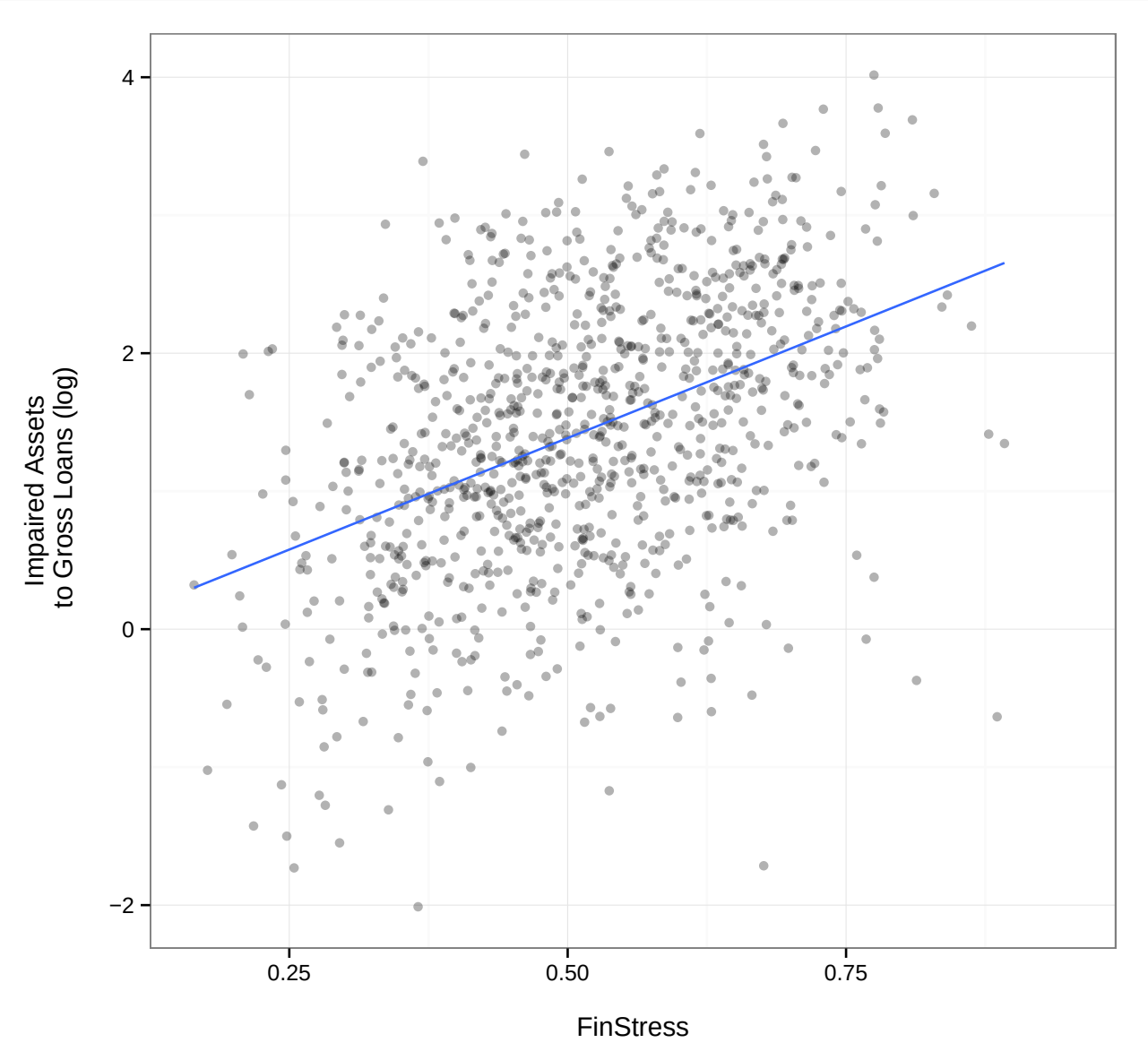
Measures stress **intensity** over time.



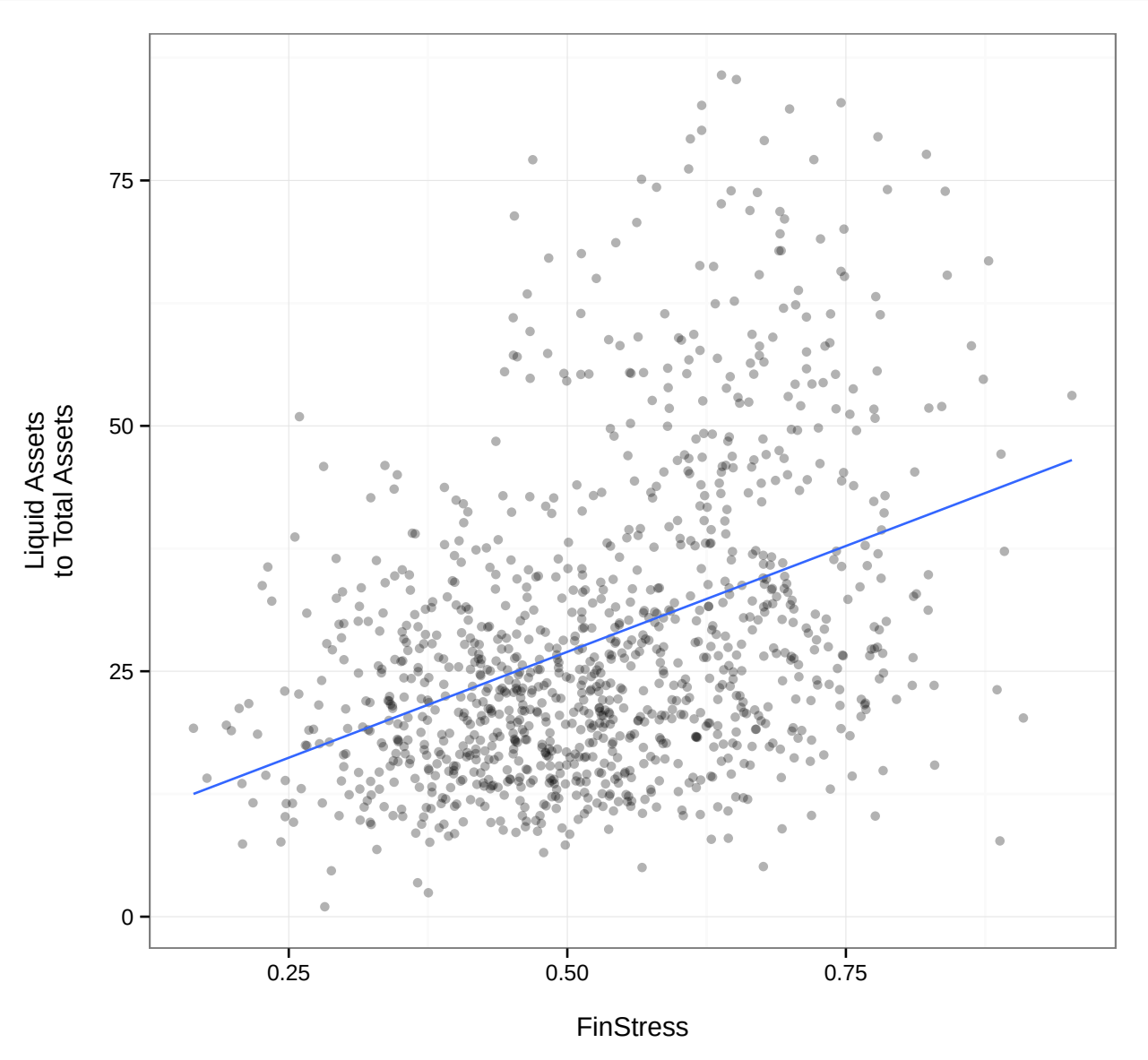
Captures increases in stress that **don't** turn into full blown crises.



STRONG/RELEVANT CORRELATIONS WITH CAMELS: NPLS



STRONG/RELEVANT CORRELATIONS WITH CAMELS: LIQUID LIABILITIES



APPLICATION: FINANCIAL CRISIS POLITICAL BUDGET CYCLES

Politicians face a dilemma: voters both **want financial stability** & **don't want expensive bailouts**.

A SOLUTION: COST REALIZATION SHIFTING

Because

- costs of responding to stress can be **shifted** by using contingent liabilities, timing privatisations, etc.

and

- and politicians have **incentives** to shift costs, especially before close elections ...

A SOLUTION: COST REALIZATION SHIFTING

...politicians may realize costs **after elections**.

Ex.: George Osborne announces money-losing RBS privatization after May 2015 election.

MEASURING AVERAGE VS. UNUSUAL COSTS

Most crises are expensive. More severe crises are more expense.

So, we need a way to measure political cost realisation decisions, separate from how intense the stress is.

I.e. separate **trend** from **off-trend** debt increases.

ESTIMATING 'OFF-TREND' DEBT

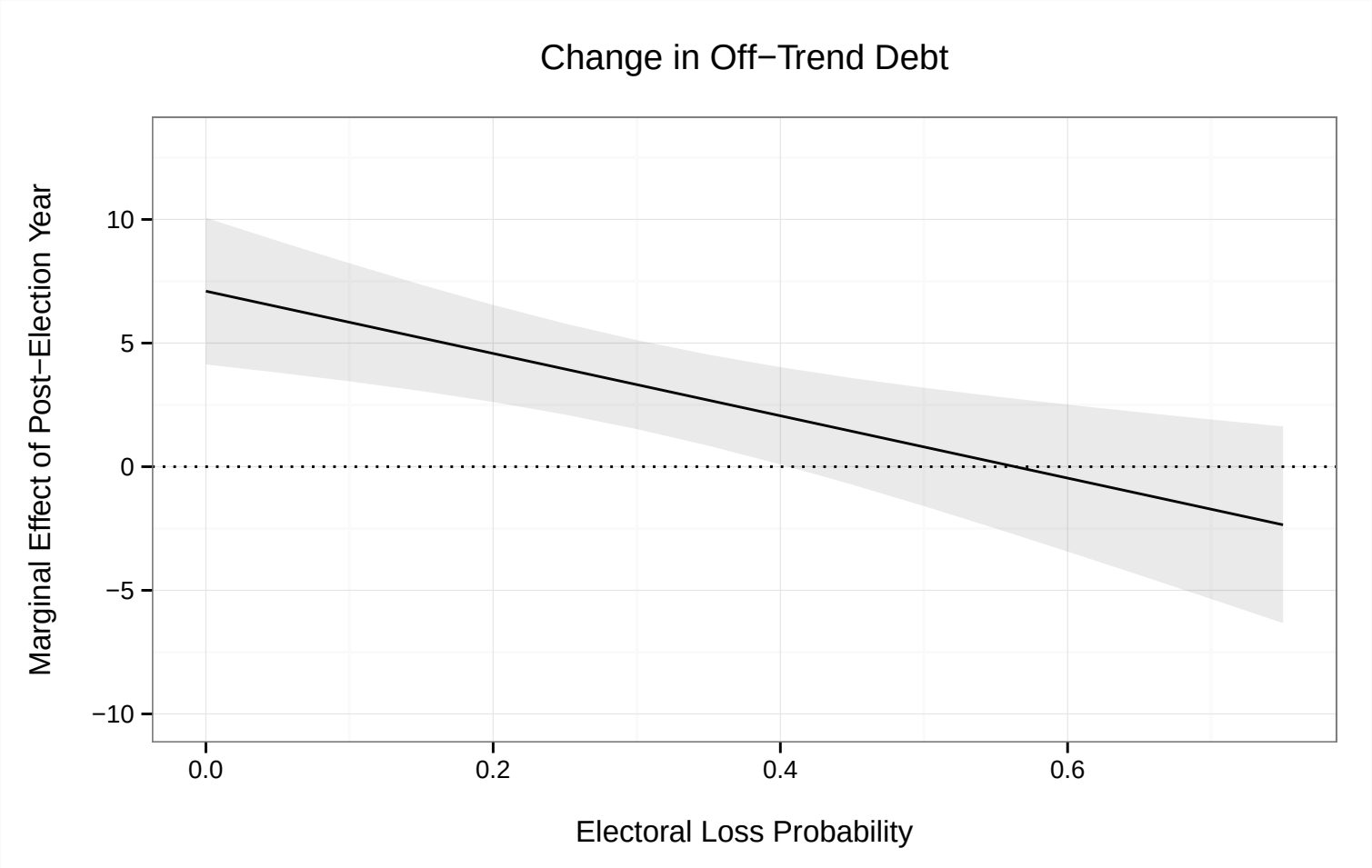
'Off-Trend' Debt estimated as **residuals** from:

	Dependent variable:
	Central Gov. Debt % GDP (2005 GDP rebased)
$Debt_{t-1}$	0.902***
	(0.045)
FinStress	19.360***
	(4.773)
Output Gap	−0.055
	(0.136)
Constant	−1.551
	(3.600)
country fixed effects	Yes
Observations	264
R^2	0.974
Adjusted R^2	0.970
Residual Std. Error	5.706
F Statistic	257.595***
Note:	*p<0.1; **p<0.05; ***p<0.01
	Standard errors in parentheses.

Off-Trend debt **increases** in the year **after** the election.

Governments that are more **electorally insecure** (measure from Kayser and Lindstaedt 2015) are **less likely** to increase off-trend debt.

Figure: Marginal Effect of Post-Election Year on Off-Trend Debt at Various Electoral Loss Probabilities



CONCLUSION

- Use **kernel PCA** to create a **new measure** of contemporaneous financial market stress–**FinStress**.
- In an application using the index, we showed that **governments reveal** more of the debt created by responding to financial market stress when they are **electorally safe**.
- Future work will try to **explain variation** in FinStress itself.

ADDITIONAL MATERIAL

SUB-STRING KERNELS

Document A	Document B
slow credit	expand credit

5 Character Kernels

slowc	expan
lowce	xpand
owcer	pandc
wcred	andcr
credi	ndcre
redit	dcred
	credi
	redit

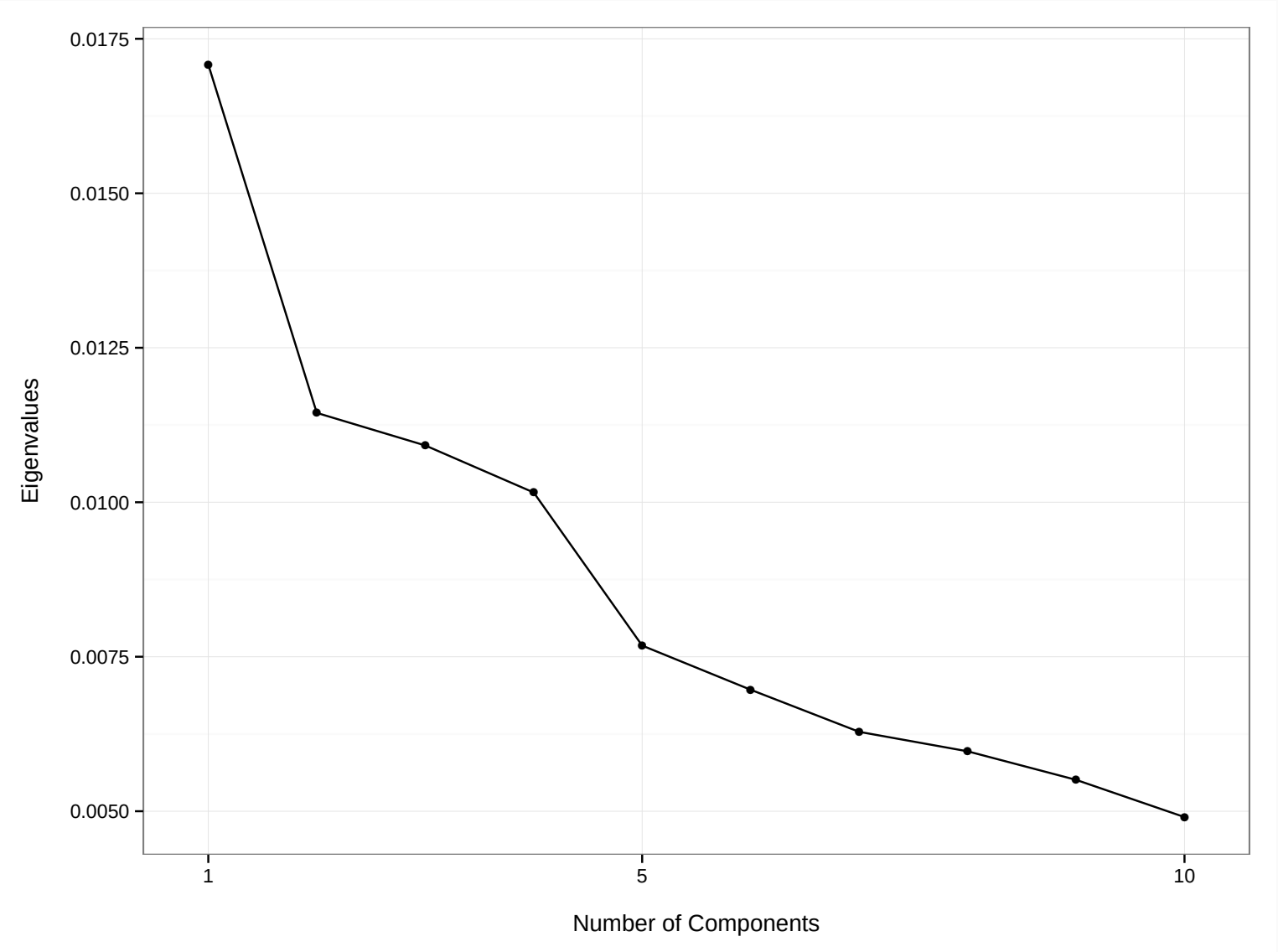
PROCESS FOR SUMMARISING KERNELS

1. Create **kernel matrix** by finding shared frequency distribution of kernels across documents, standardised by document length.

2. **Scale** using non-linear PCA.

3. **Transform**: rescale in [0, 1] and two-period moving average...

SCREE PLOT


0.0175
0.0150
0.0125
0.0100
0.0075
0.0050
Eigenvalues
1
5
10
Number of Components

RANDOM FOREST RESULTS

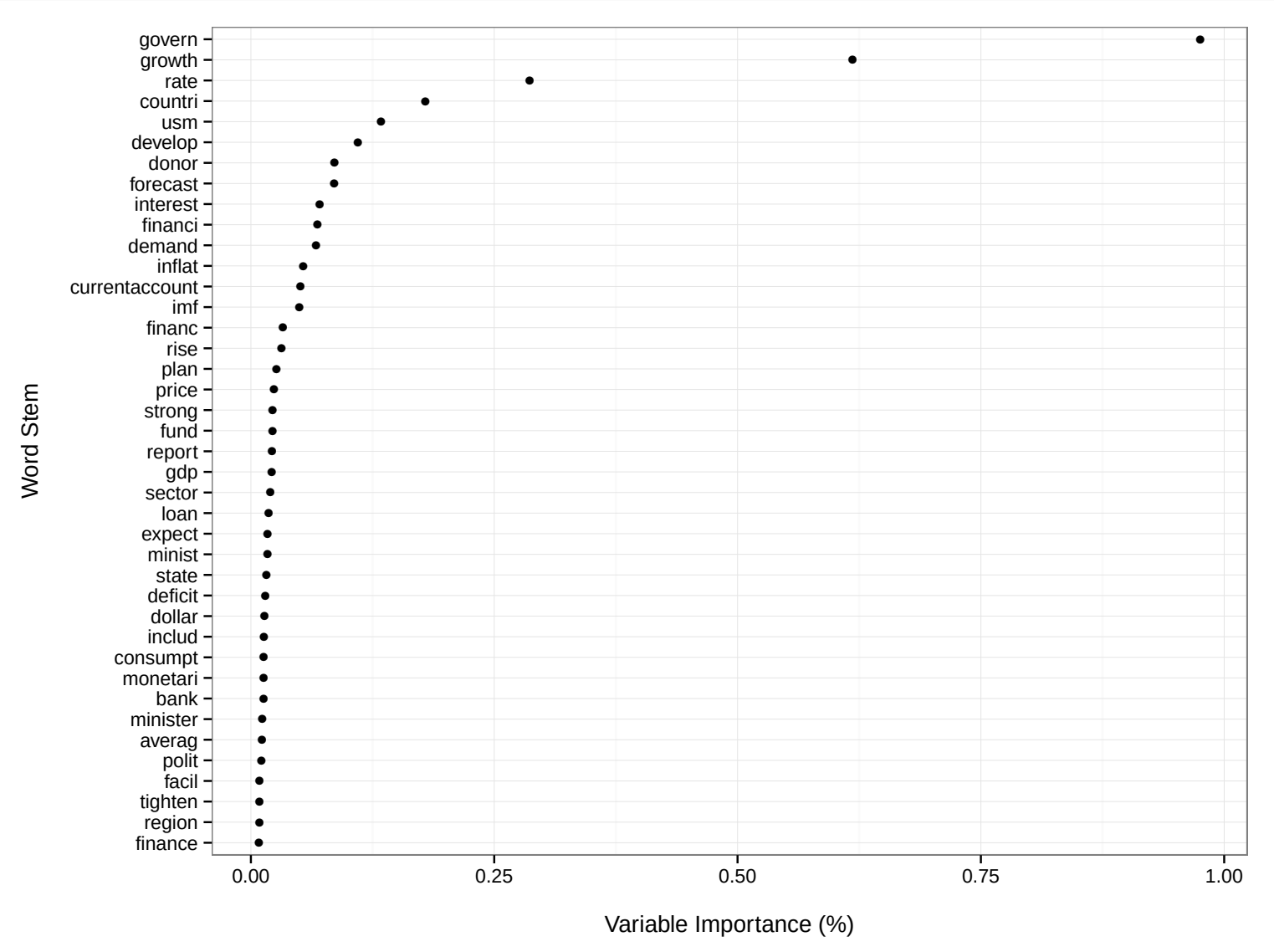
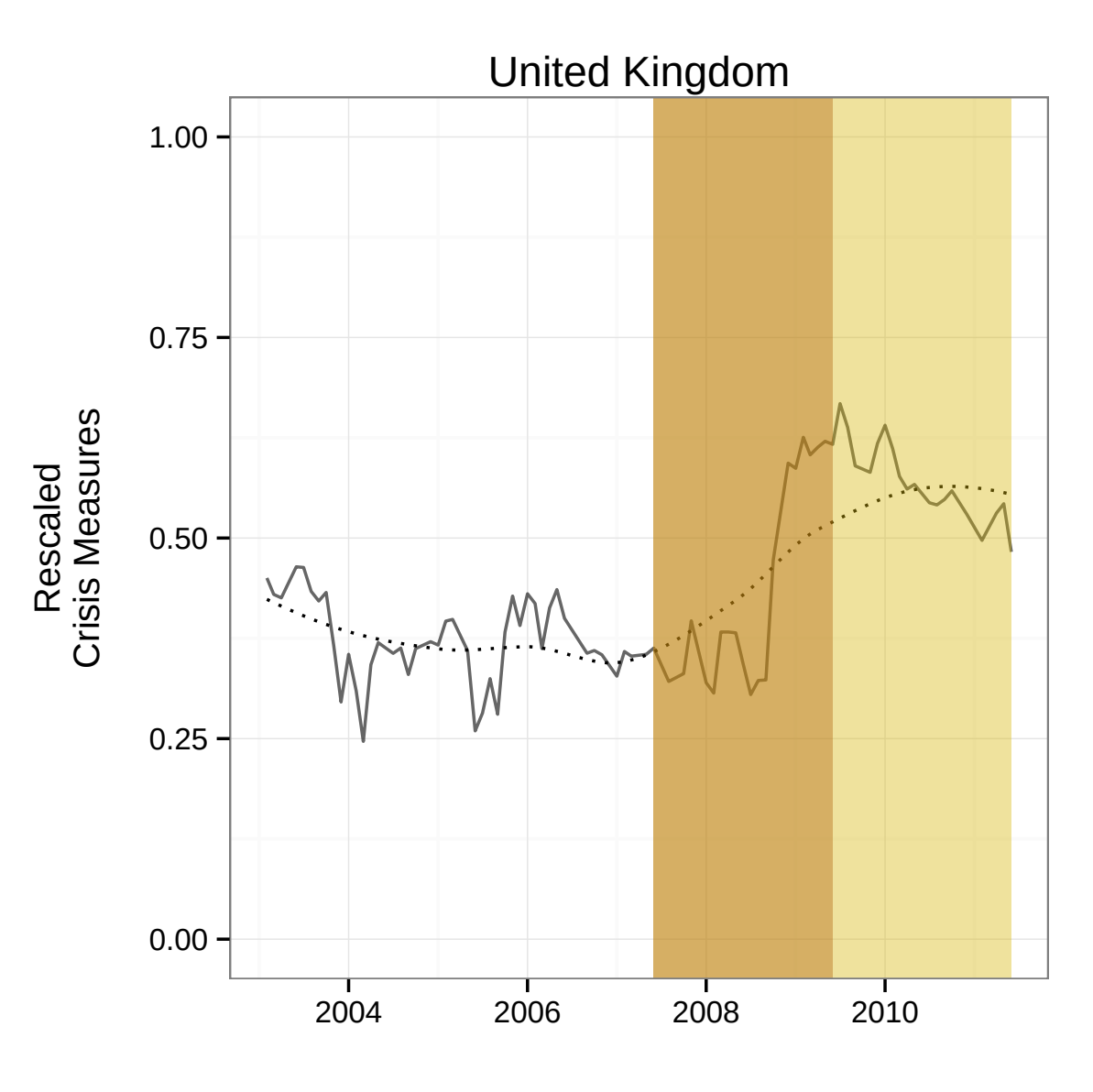


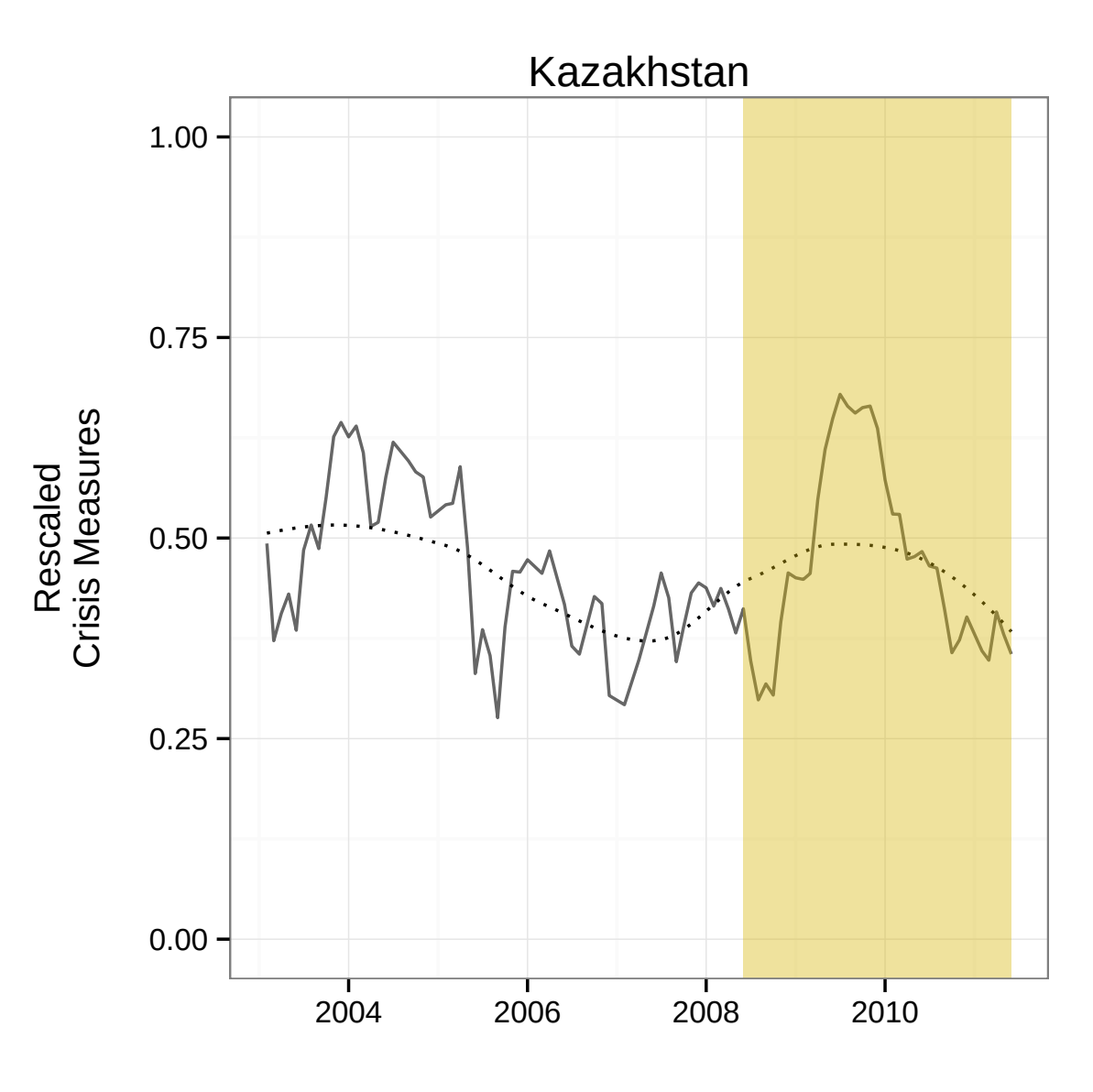
Table: Selection of Word Stems and Correlations with FinStress

Stems	Correlations
imf	0.34
assist	0.34
aid	0.28
debt	0.24
paid	0.19
strain	0.09
boom	-0.14
surplus	-0.14
rise	-0.14
weaker	-0.16
stronger	-0.17
growth	-0.28

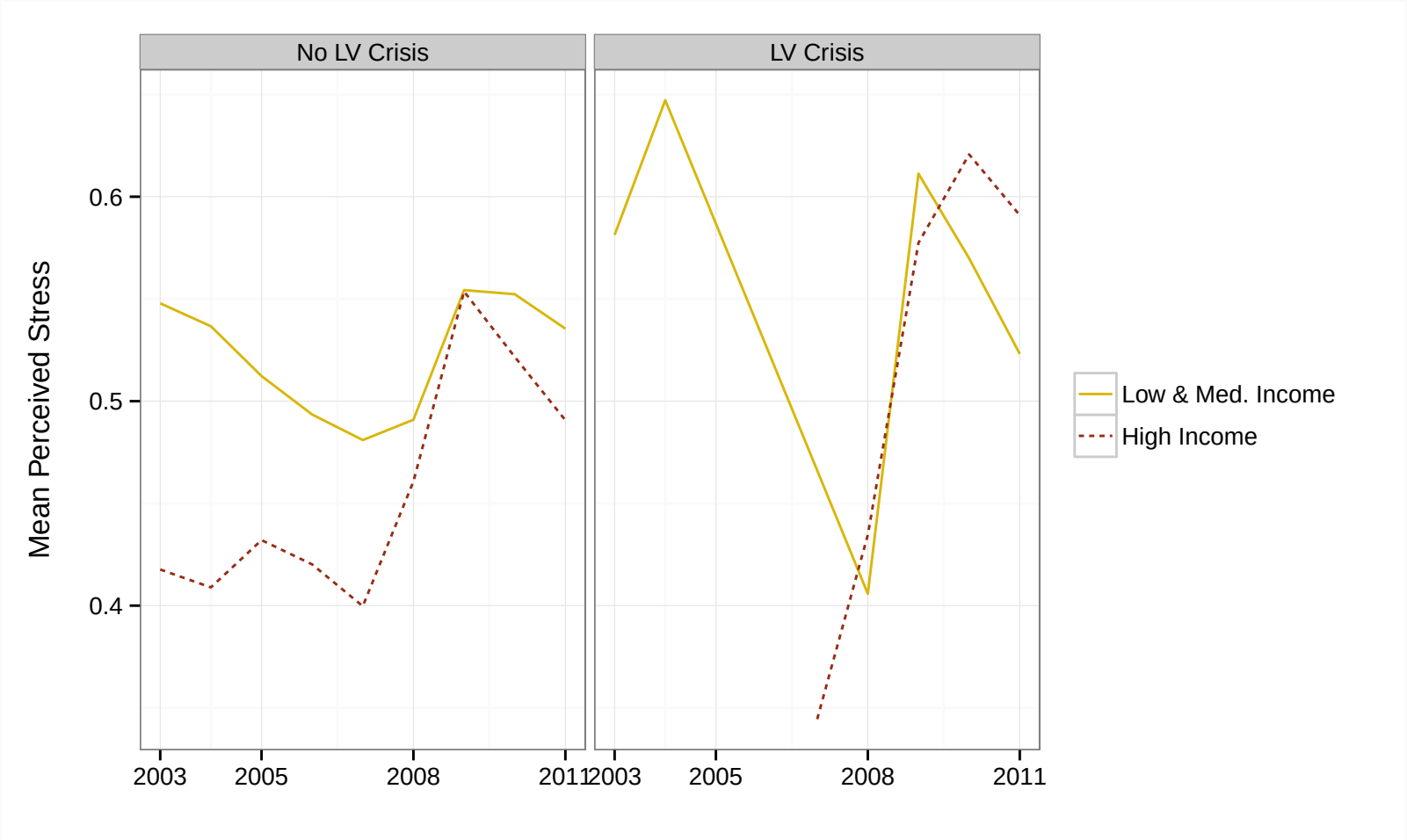
More **nuanced timing**.



More **nuanced timing**.



COMPARING DEVELOPED AND DEVELOPING



COMPARED TO Z-SCORES

	Dependent variable:						
	Δ Off-Trend Debt						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Δ Off-Trend Debt$_{t-1}$	−0.409***	−0.393***	−0.350***	−0.418***	−0.325***	−0.299***	−0.317***
	(0.089)	(0.088)	(0.084)	(0.113)	(0.093)	(0.110)	(0.110)
Δ Off-Trend Spend						0.183	
						(0.294)	
Δ Off-Trend Spend$_{t-1}$							0.266
							(0.663)
Post-Election Yr.	2.585*	6.150**	5.546**	6.833***	7.099***	7.292***	7.126***
	(1.463)	(2.377)	(2.267)	(2.317)	(1.808)	(2.099)	(2.091)
Loss Prob.	−2.428	1.706	3.962	3.804	3.391	3.452	3.288
	(5.710)	(6.052)	(3.485)	(3.743)	(2.705)	(3.036)	(3.022)
10 yr Bond Spread				−0.006	−0.0004	−0.003	−0.001
				(0.004)	(0.005)	(0.007)	(0.006)
Econ Ideology				−1.101	−0.380	−0.145	−0.185
				(0.739)	(0.552)	(0.640)	(0.643)
Political Constraints				0.361	−0.057	−0.120	−0.301
				(5.258)	(3.827)	(4.356)	(4.368)
Fixed FX				−1.835	0.008	0.180	0.191
				(1.452)	(1.072)	(1.351)	(1.353)
Post-Election Yr. * Loss Prob.		−12.599*	−11.413*	−12.495*	−12.600**	−12.991**	−12.884**
		(6.667)	(6.319)	(6.468)	(4.800)	(5.548)	(5.552)
Constant	0.304	−0.738	−1.781	1.445	−0.889	−1.546	−1.275
	(3.578)	(3.578)	(1.186)	(3.286)	(2.438)	(3.075)	(3.066)
Country fixed effects?	Yes	Yes	No	No	No	No	No
Include outliers?	No	No	No	No	Yes	Yes	Yes
Observations	132	132	132	112	104	92	92
R^2	0.239	0.264	0.177	0.224	0.277	0.269	0.267
Adjusted R^2	0.069	0.091	0.151	0.164	0.216	0.189	0.187
Residual Std. Error	7.490	7.402	7.151	6.890	4.911	5.105	5.112
F Statistic	1.403	1.522*	6.834***	3.722***	4.539***	3.358***	3.323***

Note: *p<0.1; **p<0.05; ***p<0.01
Standard errors in parentheses. Outliers include Greece and Iceland.