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 2: examine politicians’ fiscal responses to stress given that they face electoral constraints.
PROBLEMS MEASURING FINANCIAL MARKET STRESS
• 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.
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.
∙ Laborious and expensive to construct.

∙ Issues of reproducibility and Inter-coder reliability.

∙ Limited to the OECD.
· **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 an indicator that is:

- based on detailed *contemporaneous* information, representing *perceptions* of financial market stress,

- continuous,

- efficiently machine-coded.
ESTIMATING FINANCIAL MARKET STRESS
Economist Intelligence Unit (EIU) monthly country reports are:

- comparable (from 2003) for 180+ countries,

- contemporaneous.
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.
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 Me about Sub-string Kernels, Scaling
FINSTRESS COMPARED TO PREVIOUS MEASURES
Similar, but different.
Corresponds to priors based on binary crisis variables.
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

The diagram illustrates the relationship between FinStress and Impaired Assets to Gross Loans (log), showing strong and relevant correlations.
STRONG/RELEVANT CORRELATIONS WITH CAMELS: LIQUID LIABILITIES

The graph shows a scatter plot with FinStress on the x-axis and Liquid Assets to Total Assets on the y-axis. The data points are distributed across the graph, indicating a potential correlation between the two variables. The line of best fit suggests a positive relationship, with a tendency for higher FinStress values to correspond with higher ratios of Liquid Assets to Total Assets.
APPLICATION: FINANCIAL CRISIS POLITICAL BUDGET CYCLES
Politicians face a dilemma: voters both want financial stability & don’t want expensive bailouts.
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 ...
...politicians may realize costs after elections.

Ex.: George Osborne announces money-losing RBS privatization after May 2015 election.
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.
‘Off-Trend’ Debt estimated as residuals from:

<table>
<thead>
<tr>
<th>Dependent variable: Central Gov. Debt % GDP (2005 GDP rebased)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debt&lt;sub&gt;t−1&lt;/sub&gt;</td>
</tr>
<tr>
<td>(0.045)</td>
</tr>
<tr>
<td>FinStress</td>
</tr>
<tr>
<td>(4.773)</td>
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<tr>
<td>Output Gap</td>
</tr>
<tr>
<td>(0.136)</td>
</tr>
<tr>
<td>Constant</td>
</tr>
<tr>
<td>(3.600)</td>
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</table>

<table>
<thead>
<tr>
<th>country fixed effects</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observations</td>
<td>264</td>
</tr>
<tr>
<td>R²</td>
<td>0.974</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.970</td>
</tr>
<tr>
<td>Residual Std. Error</td>
<td>5.706</td>
</tr>
<tr>
<td>F Statistic</td>
<td>257.595***</td>
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</tbody>
</table>

*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

<table>
<thead>
<tr>
<th>Document A</th>
<th>Document B</th>
</tr>
</thead>
<tbody>
<tr>
<td>slow credit</td>
<td>expand credit</td>
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</tbody>
</table>

### 5 Character Kernels

<table>
<thead>
<tr>
<th>slowc</th>
<th>expan</th>
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</thead>
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<tr>
<td>lowce</td>
<td>xpand</td>
</tr>
<tr>
<td>owcer</td>
<td>pandc</td>
</tr>
<tr>
<td>wcred</td>
<td>andcr</td>
</tr>
<tr>
<td>credi</td>
<td>ndcre</td>
</tr>
<tr>
<td>redit</td>
<td>dcred</td>
</tr>
<tr>
<td>credi</td>
<td>credi</td>
</tr>
<tr>
<td>redit</td>
<td>redit</td>
</tr>
</tbody>
</table>
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

![Scree Plot]

- X-axis: Number of Components
- Y-axis: Eigenvalues

The plot shows the eigenvalues for different numbers of components. The eigenvalues decrease as the number of components increases, indicating that the components beyond the first few are less significant.
Random Forest Results

Variable Importance (%)

Word Stem

govern
growth
rate
country
usm
develop
donor
forecast
interest
financ
demand
infla
currentaccount
imf
financ
rise
plan
price
strong
fund
report
gdp
sector
loan
expect
minist
state
deficit
dollar
include
consumpt
monetari
bank
minister
averag
polit
facil	
tighten
region
finance
**Table**: Selection of Word Stems and Correlations with FinStress

<table>
<thead>
<tr>
<th>Stems</th>
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<tr>
<td>imf</td>
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<td>aid</td>
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<td>debt</td>
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<td>paid</td>
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</tr>
<tr>
<td>strain</td>
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<tr>
<td>boom</td>
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<td>surplus</td>
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<tr>
<td>rise</td>
<td>-0.14</td>
</tr>
<tr>
<td>weaker</td>
<td>-0.16</td>
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<tr>
<td>stronger</td>
<td>-0.17</td>
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<tr>
<td>growth</td>
<td>-0.28</td>
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</table>
More nuanced timing.
More nuanced timing.
COMPARING DEVELOPED AND DEVELOPING

Mean Perceived Stress

No LV Crisis

LV Crisis

Low & Med. Income

High Income

2003 2005 2008 2011
## Dependent variable: Δ Off-Trend Debt

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<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
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<tr>
<td>Δ Off-Trend Debt_{t-1}</td>
<td>-0.409***</td>
<td>-0.393***</td>
<td>-0.350***</td>
<td>-0.418***</td>
<td>-0.325***</td>
<td>-0.299***</td>
<td>-0.317***</td>
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<td></td>
<td>(0.089)</td>
<td>(0.088)</td>
<td>(0.084)</td>
<td>(0.113)</td>
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<td>Δ Off-Trend Spend</td>
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<td>0.266</td>
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<td>Post-Election Yr.</td>
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<td>6.150**</td>
<td>5.546**</td>
<td>6.833***</td>
<td>7.099***</td>
<td>7.292***</td>
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<td></td>
<td>(1.463)</td>
<td>(2.377)</td>
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<td>(2.317)</td>
<td>(1.808)</td>
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<td></td>
<td>(5.710)</td>
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<td>(3.485)</td>
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<td>10 yr Bond Spread</td>
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<td>Political Constraints</td>
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<td></td>
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<td>(3.578)</td>
<td>(1.856)</td>
<td>(2.826)</td>
<td>(2.438)</td>
<td>(3.075)</td>
<td>(3.066)</td>
</tr>
</tbody>
</table>

### Country fixed effects?
- Yes
- No

### Include outliers?
- Yes
- No

### Observations
- 132
- 132
- 132
- 112
- 104
- 92
- 92

### R²
- 0.239
- 0.264
- 0.177
- 0.224
- 0.277
- 0.269
- 0.267

### Adjusted R²
- 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.