Market discipline? Sovereign spreads, fiscal adjustments and political turnover

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“If the spread gets out of hand, we’ll have to adjust the fiscal stance.”

Paolo Savona, Italian Minister of European Affairs (October 2018)
The spread and the economy: interdependence

Financial markets demand larger spreads...

- whenever the sustainability of public finances is in doubt
- country-specific fundamentals are weak

At the same time, rising spreads can...

- feed back into the economy
- induce policymakers to adjust fiscal policy
Research question

Do rising sovereign spreads impact a) economic activity, b) the policy stance, and c) election outcomes?
Empirical investigation based on a unique data set:

- Quarterly time-series for 38 advanced and emerging economies since early 1990s until 2017
- Variety of macroeconomic and political indicators and sovereign yield spreads

Spread...

- fluctuates widely across time and countries
- co-moves significantly with economic activity, less so with fiscal indicators
Identification strategy

Issue

• Spread generally responds to changes in fundamentals

But also exogenous fluctuations in sovereign spreads due to...

• global factors (Longstaff et al. 2011; Mauro, Sussman, et al. 2002)

• market sentiments (Calvo 1988; Cole and Kehoe 2000; Lorenzoni and Werning 2014)
Spreads and fundamentals

We look at the relation between the spreads and the debt to GDP ratio, as the latter is the most important fundamental variable in influencing the spreads (as will become clear from our econometric analysis).

We first present the relation between the spreads and the debt-to-GDP ratios in the Eurozone. This is done in Fig. 3, which shows the spreads on vertical axis and the debt to GDP ratios on the horizontal axis in the Eurozone countries. Each point is a particular observation of one of the countries in a particular quarter (sample period 2000Q1–2011Q3). We also draw a straight line obtained from a simple regression of the spread as a function of the debt to GDP ratio.

We observe first that there is a positive relation (represented by the positively sloped regression line) between the spread and the debt to GDP ratio, i.e. higher spreads are associated with higher debt to GDP ratios. We will return to this relationship and present more precise statistical results in the next section.

A second observation to be made from Fig. 3 is that the deviations from the fundamental line (the regression line) appear to occur in bursts that are time dependent. We show this in Fig. 4, which is the same as Fig. 3 but where we have highlighted all observations that are more than 3 standard deviations from the mean in a triangle. It is striking to find that all these observations concern three countries (Greece, Portugal and Ireland) and that these observations are highly time dependent, i.e. the deviations start at one particular moment of time and then continue to increase in the next consecutive periods. Thus, the dramatic increases in the spreads that we observe in these countries from 2010 on do not appear to be much related to the increase in the debt to GDP ratios during the same period. This is as the theory predicts. We will analyze whether this results stands the scrutiny of econometric testing.

Do the same developments occur in "stand-alone" countries, i.e. countries that are not part of a monetary union and issue debt in their own currencies? To test this, we selected countries whose GDP per capita/C21$ 20,000 and population/C215 million. There are 14 "stand-alone" developed countries (Australia, Canada, Czech Republic, Denmark, Hungary, Japan, South Korea, Norway, Poland, Singapore, Sweden, Switzerland, the UK and the US) in this control group. In order to make the analysis comparable with our analysis of the Eurozone countries, we select the same risk free government bond, i.e. the German government bond and compute the spreads of the 10-year government bond rates. We could also have selected the US government bond. In fact doing so leads to very similar results.

It is important to stress that the spreads between "stand-alone" countries reflect not only default risk but also exchange rate risk. It is even likely that the latter dominates the default risk, as exchange rates exhibit large fluctuations thereby creating large risks resulting from these fluctuations.

Spreads and debt-to-GDP ratio in Eurozone (2000Q1–2011Q3)
Source: De Grauwe and Ji (2013)
Approach: Estimation of an average treatment effect

First step

• Isolate large increases of sovereign spreads: some 220 “treatments”

• Arguably, sharp increase of spread more likely to reflect market sentiments

Second step

• Control for “selection into treatment” based on fundamentals

• Estimate probability of treatment given fundamentals
Approach: Estimation of an average treatment effect

Third step

- Estimate average treatment effect on output and fiscal and political outcomes
- Make use of augmented inverse propensity score weighted (AIPW) estimator (Jordà and Taylor 2016)
- AIPW includes regression adjustment to control for impact of fundamentals on outcome variables
Results

Treatment (Sharp increase of sovereign spread)

- Sovereign spread rises persistently
- Output and government spending decline
- Probability of political turnover increases

Robust across range of alternative specifications
Literature

Several studies on “market discipline”


Effect of interest rate shocks on macroeconomic performance

- Neumeyer and Perri (2005) and Uribe and Yue (2006)

Evidence on the impact of economic conditions on election outcomes

- Scholl (2017) and Funke et al. (2016). See Dassonneville and Lewis-Beck (2014) for a more general discussion
Sovereign yield spreads

Quarterly data for 38 emerging and advanced economies starting in early 1990s until 2017

• Based on Born et al. (2018)

Spreads measure financial markets’ assessment of government solvency

• Affect real financing costs of countries

Computed as difference in sovereign yield vis-à-vis risk-free bond issued in common currency

• Eliminates effect of inflation and exchange rate depreciation expectations
Quarterly spread changes (basis points)

- Spread changes exhibit large excess kurtosis (> 3) → “fat tails”
- Skewness > 1 → presence of large positive “outliers”
Slight negative correlation of spread changes and output growth

No systematic co-movement with fiscal variables
Empirical strategy

1. Define sharp sovereign spread increase: “treatment”

2. Control for country-specific fundamentals by estimating a logit model → Delivers propensity score (probability of treatment)

3. Estimate average treatment effect (ATE) using augmented inverse propensity score weighted estimator (Jordà and Taylor 2016; Lunceford and Davidian 2004) for a set of macroeconomic and political indicators
Definition of treatment

Quarter-country observation which satisfies:

\[ D_{i,t} = \mathbb{1}(\Delta s_{i,t} \geq \sigma_i \land \Delta s_{i,t} \geq 25bp) \]

- \( D_{i,t} \): treatment at time \( t \) for country \( i \)
- \( \Delta s_{i,t} \): sovereign spread change of country \( i \) at time \( t \)
- \( \sigma_i \): distributional standard deviation of \( \Delta s_{i,t} \)

220 treatments distributed over 47 out of 152 quarters

→ 7 percent of total observations for sovereign spread changes
→ every 3 quarters at least one country faces a “treatment”
Treatments across the world
Estimation of propensity score

Quarterly logit model

\[ D_{i,t} = \alpha + \beta X_{i,t} + \gamma Z_{i,t} + \delta V_{i,t-1} + \kappa_i + \epsilon_{i,t} \]

- \( X_{i,t} \): Country-specific fundamentals (debt-to-GDP, GDP growth, inflation, . . . )
- \( Z_{i,t} \): Dummy variables (IMF assistance, . . . )
- \( V_{i,t-1} \): Lagged values of some country-specific fundamentals
- \( \kappa_i \): Country-fixed effects

→ Compute propensity scores \( \hat{p}(D_{i,t} = 1|X_{i,t}, Z_{i,t}, V_{i,t-1}) \)
Propensity score: treated vs untreated

Significant overlap between treatment and control group

- Treatment assigned randomly
Conditional independence assumption

\[ Y_{i,t+h} - Y_{i,t-1} \perp D_{i,t} \quad \mid \quad p(D_{i,t} = 1|X_{i,t}, Z_{i,t}, V_{i,t-1}) \quad \text{for } h \geq 0 \]

**Intuition:** outcome and allocation into treatment and control group are independent conditional on the propensity score (Rosenbaum and Rubin 1983)

**Econometric approach:** “Re-randomization” of treatment by means of inverse propensity-score weighting
Average treatment effect

Augmented inverse propensity score weighted (AIPW) estimator

\[
ATE_{AIPW}^h = \frac{1}{N} \sum_{t=1}^{N} \frac{D_t(Y_{t+h} - Y_{t-1})}{\hat{p}_t(X_t, Z_t, V_{t-1})} 
- \frac{1}{N} \sum_{t=1}^{N} \frac{(1 - D_t)(Y_{t+h} - Y_{t-1})}{1 - \hat{p}_t(X_t, Z_t, V_{t-1})}
\]

which additionally includes a regression adjustment (not shown)

**Intuition:** weight observations with high propensity score \(\hat{p}\) less

\(\rightarrow\) sovereign spread increase likely caused by fundamentals
Results: response to spread shock

Additional outcome variables
Output and spending don’t respond to spread reduction: Asymmetry

![Graphs showing sovereign spread, output, and government spending](graphs.png)
Low- and high-debt economies behave similarly...
...as do advanced and emerging economies
Financial / European sovereign debt crises not main driver

Sample up until 2007

Sovereign spread

Output

Government spending

Euro area countries only

Sovereign spread

Output

Government spending

Introduction Data Methodology Results Political Turnover Conclusion
ATE of sovereign spread shock: conservative treatment

Quarter-country observation which satisfies:

\[ D_{i,t} = \mathbb{1}(\Delta s_{i,t} \geq \sigma_i \land \Delta s_{i,t} \geq 50 \text{ bps}) \]
ATE of sovereign spread shock: richer logit model

Additional controls in first stage logit model

- Forecasts for government spending and output, credit growth in private nonfinancial sector
Can financial markets induce political turnover?

Data

- Archigos database of political leaders (Goemans et al. 2009)
- Political turnover based on entry and exit of political leaders
- 283 changes of government in our sample

Estimation strategy

- Logit model including inverse propensity score as weights
  - controls for country-specific fundamentals
Average marginal effect of spread shock: political turnover

- Sharp spread increase leads to higher probability of political turnover over the next $h$ quarters
  → about 15 percentage points over the next 2 years

- Sharp spread decreases do not have much of an effect
Conclusion

Do rising sovereign spreads impact a) economic activity, b) the policy stance, and c) election outcomes?

- Yes: output falls
- Yes: government spending is cut
- Yes: political turnover becomes more likely
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Market discipline? Results consistent with two alternative views

- Benign view: important to get economies back on track
- Critical view: markets enforce untimely austerity
Construction of default premium: two examples

Italy

0
2
4
6
8
10 
Spread 
Yield
Benchmark

United Kingdom

0
2
4
6
8 B1 
B1 B1+B2 Long Term Convergence Rates 
B2 CMA 
CDS
TR 
CDS
B2

Appendix
Treatments across Europe

Appendix
## Logit model estimation results

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Logit model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average marginal effects</td>
</tr>
<tr>
<td>$D_{i,t}$</td>
<td></td>
</tr>
<tr>
<td>Debt-to-GDP</td>
<td>.9276483* (.4083627)</td>
</tr>
<tr>
<td>GDP growth</td>
<td>-3.219265*** (.7655932)</td>
</tr>
<tr>
<td>Growth in gov. spending</td>
<td>.6208748 (.4680838)</td>
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<tr>
<td>Tax revenue</td>
<td>-.2393848 (.2619834)</td>
</tr>
<tr>
<td>Deficit-to-GDP</td>
<td>.1965439 (.212037)</td>
</tr>
<tr>
<td>Nom. interest rate</td>
<td>.002392 (.0050141)</td>
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<tr>
<td>NFA</td>
<td>-.0841168* (.0396131)</td>
</tr>
<tr>
<td>Trade balance</td>
<td>-.8204448** (.2985934)</td>
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<tr>
<td>Inflation</td>
<td>-.370373 (.7852661)</td>
</tr>
<tr>
<td>Log eff. nom. FX</td>
<td>.047433 (.1815818)</td>
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<tr>
<td>Lagged debt-to-GDP</td>
<td>-.7821325 (.4058027)</td>
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<tr>
<td>Lagged GDP growth</td>
<td>.5353401 (.6055954)</td>
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<tr>
<td>Lagged growth in gov. spending</td>
<td>-.5445016 (.512149)</td>
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<tr>
<td>Lagged tax revenue</td>
<td>.2211327 (.2619832)</td>
</tr>
<tr>
<td>Lagged deficit-to-GDP</td>
<td>.3280623 (.1858253)</td>
</tr>
<tr>
<td>Lagged spread change in bp</td>
<td>.0002213* (.0000974)</td>
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</tbody>
</table>

| N         | 1251 |
| ROC       | 0.8078 |
| (0.0215)  |      |

Logit model estimation results to predict propensity scores. Country-fixed effects are included but not reported. Standard errors in parenthesis. ****/***/* indicate statistical significance at the 1/5/10 percent level.
Unconditional correlations

Growth in real government spending

Advanced

Emerging

Correlation: 0.0635 (0.0116)

Correlation: -0.0211 (0.4502)
Unconditional correlations

Tax-revenue-to-GDP ratio

Advanced

Emerging

Correlation: -0.0329 (0.2408)

Correlation: 0.0217 (0.7534)
Unconditional correlations

Deficit-to-GDP ratio

Advanced

Emerging

Correlation: 0.0327 (0.2304)

Correlation: -0.0181 (0.6141)
Additional outcome variables

![Graphs showing trends in tax revenue, deficit to GDP, tax to GDP, and government spending to GDP over quarters.](image)