

Signalling fiscal stress in the euro area A country-specific early warning system

A discussion

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Aim of the paper

- Signalling approach (e.g., Kaminski and Reinhart, 1999): at the ground of many early warning systems
- Main idea: identify thresholds of key variables permitting a swift identification of increased risk. Broad criterion: adequate balance between missed crises and false alarms
- Needed: sufficiently many crisis data ———> signalling approach generally implemented in pooled data, putting together information for different countries
- The paper makes a step forward in estimating county specific thresholds using the signalling approach

Main achievements and results

- Important objective. Well-known that debt tolerance is largely country-specific, depending inter-alia on:
 - Debt characteristics (net debt, duration, foreign exposure, FX exposure...)
 - Economic and public finance prospects (growth potential, tax burden,...)
 - Fiscal governance (fiscal and non-fiscal institutions)
 - Macro imbalances (private debt, external debt, current account balances and prospects, real estate boom-bust)
 - Financial sector conditions (capitalisation, profitability,... ...)
- Country-specific thresholds
 - permit to take into account such heterogeneity
 - As thresholds are built to fit each countries' data, country-specific thresholds permit to achieve a higher signal power *across the whole panel* as compared to single one-size-fits-all thresholds
 - Complements "standard S0"

Main limitations

- Few episodes of crisis starts across the EA11, 1970-2010 sample (27 crisis episodes in total, 15 crisis starts: 1.36 per country on avg.):
- Implications
 - For 3 countries where no crisis have occurred signal power is not defined (Prob missed crisis=No. crises not called/No. crises) \longrightarrow $T=\text{Max}V$ (e.g., govt. debt in BE=134%)
 - For 2 countries with 1 crisis start, $T=V$ in crisis year; Prob missed crisis=0 \longrightarrow signal power =1 (e.g., govt. debt in DE=18%)
- Questions
 - Signal power is mechanically high: but are thresholds representative?
 - Can future crisis probability be inferred from past on the basis of few observations?

Main limitations

- More fundamentally, is crisis probability fully country-specific and time invariant?
 - For instance, govt. debt > 18% should still imply high risk for DE now because of a crisis taking place in 1974? Or have country characteristics changed?
 - In a nutshell, is the identity of the country that matters or a combination of its key characteristics?
 - Similar problem as predicting on the basis of fixed effects from probit/logit models/

Are there alternatives?

Sample split by main characteristics

- How to go beyond one-size-fits-all thresholds while addressing above limitations?
- A first approach could be to ***apply the signalling approach to sub-samples*** where countries are grouped according to structural characteristics that contribute to the riskiness of a particular variables

– E.g.,

Govt. debt	
High. share of short-term debt	High. share of short-term debt

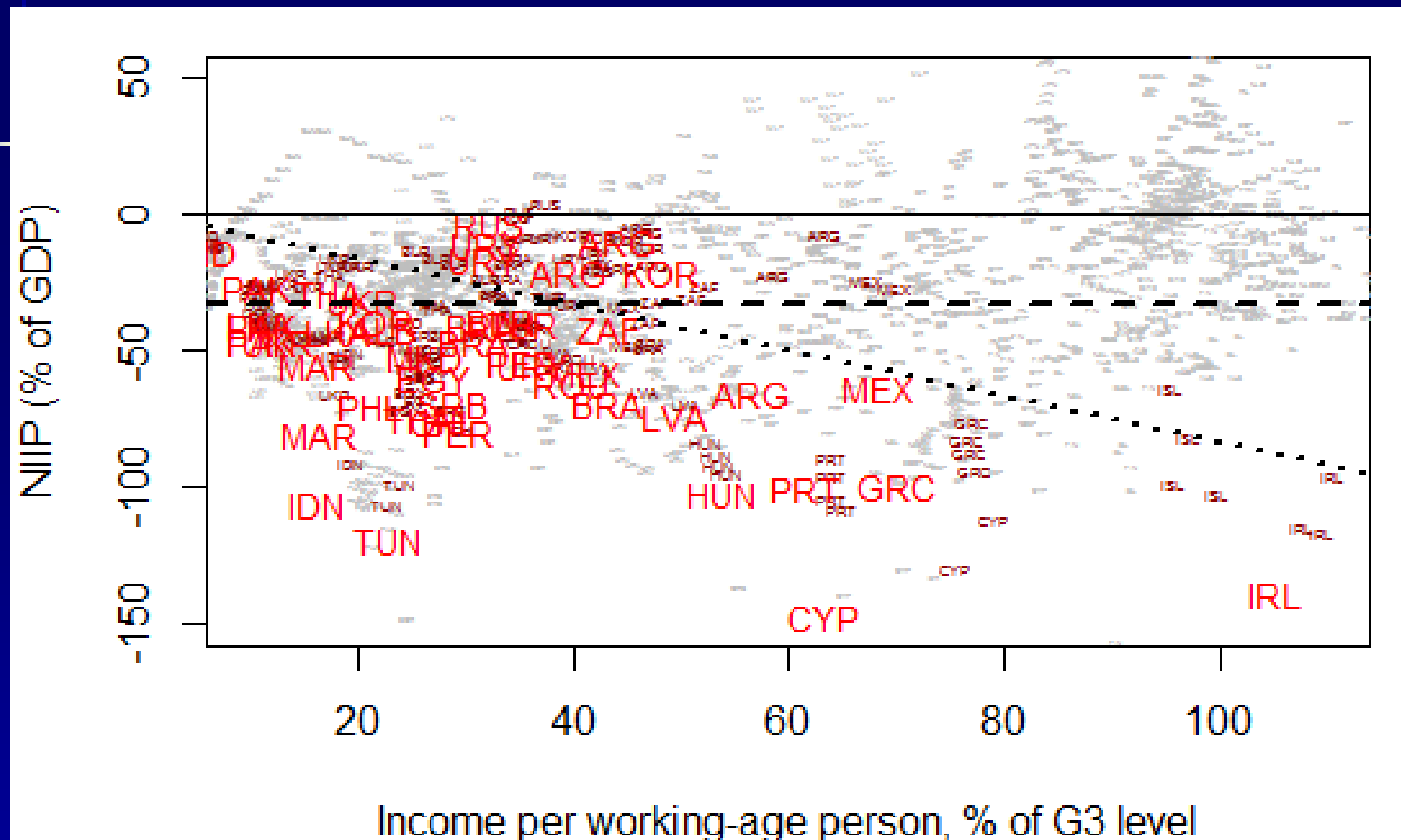
Govt. debt	
High. share of short-term debt	High. share of short-term debt
High current account balance	Small current account balance

Are there alternatives?

Variable interactions

- A second approach could be to ***apply the signalling approach to variables interacted*** with measures of structural characteristics that contribute to the riskiness of a particular variables (Commission NIIP benchmarks, Turrini and Zeugner forthcoming)
 - E.g., Govt. debt * share of short-term debt
Govt. debt * share of govt. debt / potential growth
- Defining a threshold for interacted variables permit to take into account additional information and get higher signal power

Interacting NIIP with income allows for better separating crisis vs. non-crisis episodes



Large red: crisis start in t+1, small red: crisis within 5 years, grey: no crisis
1980-2015, relative income is GDP in PPP per working-age person as % of G3

Advantages of alternatives that allow availability of numerous crisis years

Availability of numerous crisis years allow additional metrics to assess thresholds:

- Robustness wrt. sample perturbations
- Robustness with respect to alternative criteria for computing thresholds AUROC (are under ROC curve, reporting the ratio correct signals/false alarm for each value of the variable)

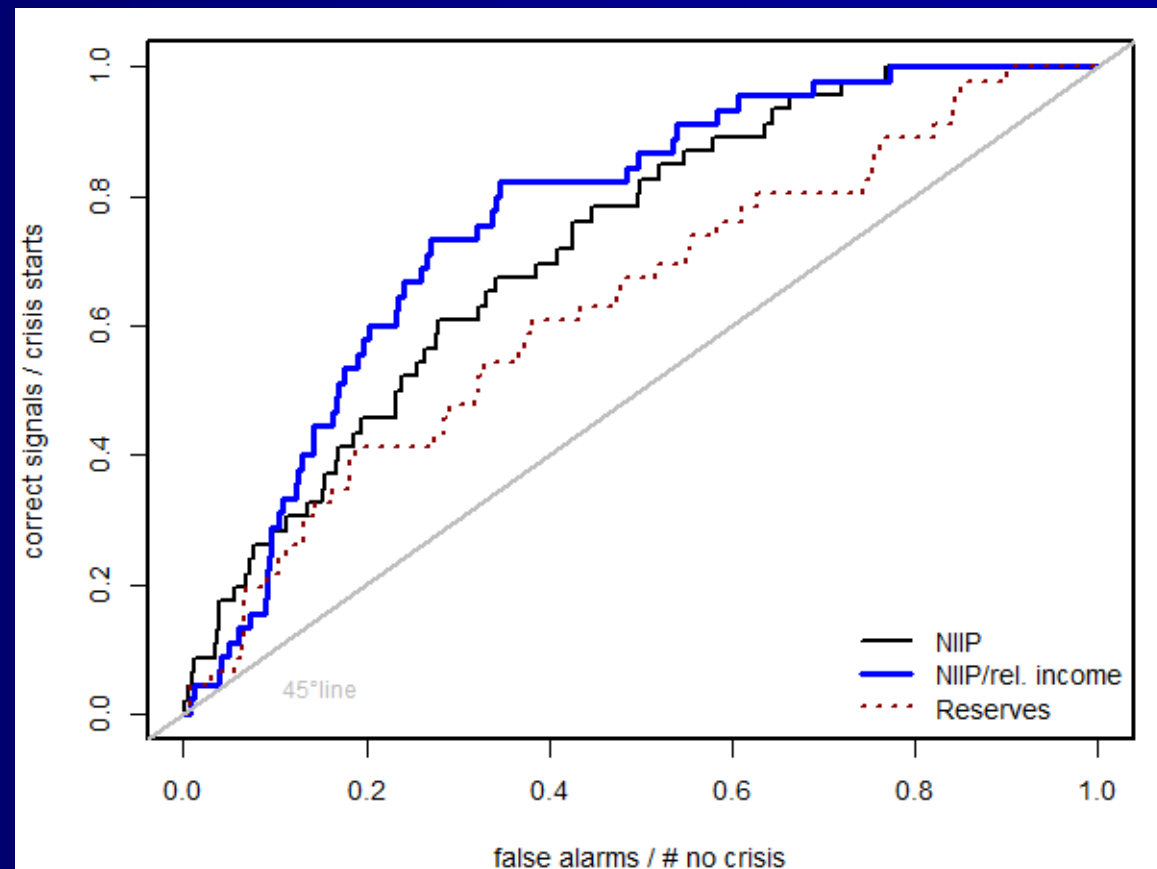
	Threshold	Signal power of (1)	Missed crises (%)	False alerts (%)	Std. dev of (1) wrt. sample perturbations	AUROC	Median c.s. threshold.
NIIP	-25	0.34	0.22	0.45	8	0.72	
NIIP / relative per capita income	-83	0.48	0.18	0.35	9	0.77	-44
NIIP * Non-FDI liabilities / total liab.	-65	0.38	0.38	0.24	10	0.74	-46
NIIP / imports	-131	0.41	0.33	0.26	26	0.77	-40
NIIP / Fraser economic freedom index	-7	0.45	0.33	0.22	1	0.77	-46

Advantages of alternatives that allow availability of numerous crisis years

Area under Receiver Operating Characteristic, selected indicators signalling external crises

AUROC: area under ROC=share correct/false signals

Measures signal power of a variables irrespective of specific criterion to choose the threshold



Aggregating thresholds

- Should thresholds be aggregated into a synthetic indicator?

- Allow synthesis, combine information and leads to higher signal power.
- But contribution of single variables to level and changes of the synthetic indicator is also key: this info should not be lost

- Which weights for the aggregation?

- Fiscal variables do not add much to S_0 (their inclusion even reduce out-of-sample signal power!)
- Current criterion: variables weighted according to the signal power of the associated threshold. This is NOT a measure of the signal power of the variables itself, but a measure of the extent of which the signal power of the variable is non-linear (raises significantly when values are above a given threshold)

- Alternatives?

- $AUROC_i / \sum_i AUROC_i$

- $\sum_j \beta_j X_j / \sum_i \sum_j \beta_j X_j$,

i.e., prediction from probit/logit multivariate empirical model for crises