

## How Sustainable are Public Debt Levels in CEE?

Evidence for Selected CESEE Countries from a Stochastic Debt Sustainability Analysis

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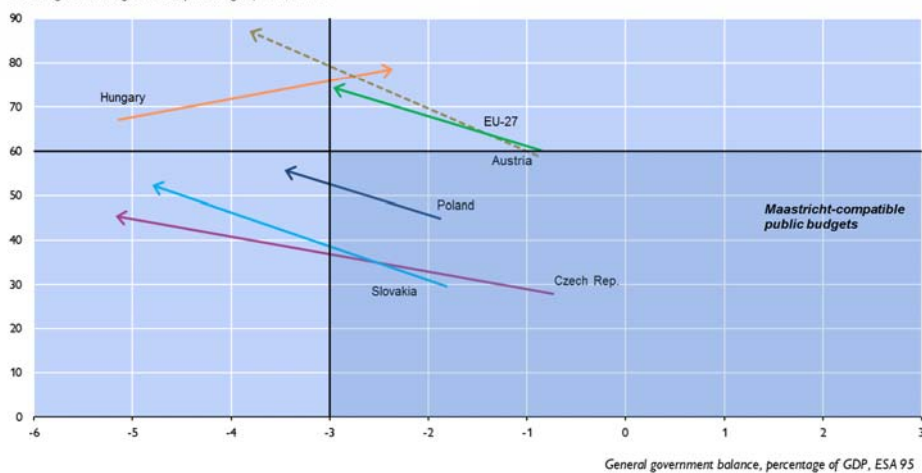
wiiw Spring Seminar 2013
   
 Vienna, 21 March 2013

Opinions expressed do not necessarily reflect the official viewpoint of the OeNB or the Eurosystem

## Public Debt: An Issue in CESEE?

### Fiscal Developments in CEE-4, compared with Austria and EU-27, between 2007 and 2012

General government gross debt, percentage of GDP, ESA 95



Source: European Commission, AMECO database. 2012 data are forecasts as of 15th March 2013.

Note: The first observation point (2007) is marked by the name of the country, the last observation point (2012) by the end of the arrow.

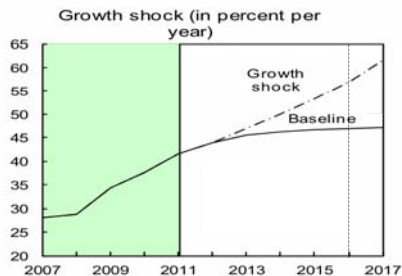
### What is Special about Public Debt in Emerging Economies?

- Comparatively **low debt tolerance thresholds**: in 55% of the defaults recorded in EMs, public debt was below 60% of GDP (IMF, 2003)
- **Limited tax raising capacity** (e.g. due to a large informal sector)
- **Volatile** revenue base and volatile expenditures
- **Pro-cyclical discretionary fiscal policy**
- **'When it rains it pours'**-phenomenon (Kaminsky et al., 2004)
- High share of **FX-denominated liabilities**
- **Short time series** of economic and fiscal data with **structural breaks**

## 1. Stochastic Debt Sustainability Analysis: Framework

## Debt Sustainability Analysis (DSA) Approaches

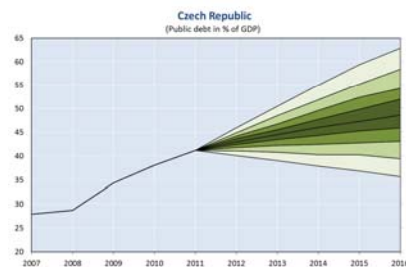
Deterministic DSA (IMF)



Source: IMF Article IV Consultation Report of the Czech Republic, 2011

- Single debt trajectories
- A few stylized, **isolated** shocks (e.g. growth shock)
- Exogenous fiscal policy (FP)

Stochastic DSA



- Follows Celasun et al. (2007)
- Debt paths frequency distribution
- Many random shocks with **interaction** among macro variables
- FP reacts to debt and macro shocks

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## Debt Sustainability: Definition

- Both deterministic and stochastic DSAs produce only **projections** of future debt paths, **not an explicit assessment** of their sustainability
- But, to assess sustainability, **realistic projections** taking into account possible risks, are necessary

- **Strict sustainability:**  $\lim_{t \rightarrow \infty} E(d_t) = 0$  and  $\lim_{t \rightarrow \infty} E(\sigma_{d_t}^2) < \infty$   
→ non-exploding debt path

- Not useful in empirical applications: not possible to make forecasts over infinite horizon

- Hence a weaker definition, e.g. (Ferrucci & Penalver, 2003):

**There is a reasonably high probability (say 75%) that debt-to-GDP ( $d_t$ ) is *not* higher at the end of the forecast horizon than at the beginning**

$$P(d_t \geq d_{t+\tau}) > 0.75$$

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### Building Blocks of the S-DSA

- Debt-deficit stock-flow identity (for a sovereign issuing in FX):

$$d_t \equiv d_t^f + d_t^d = (1 + g_t)^{-1} \left[ \overbrace{(1 + r_t^f)(1 + \Delta z_t)d_{t-1}^f}^{\text{FX debt}} + \overbrace{(1 + r_t)d_{t-1}^d}^{\text{LC debt}} \right] - pb_t + s_t$$

- $d_t^f$ ...FX debt,  $d_t^d$ ...LC debt,  $r_t$  or  $r_t^f$ ...real domestic or foreign interest rate,  $z_t$ ...real effective exchange rate,  $g_t$ ...real GDP growth,  $pb_t$ ...primary balance,  $s_t$ ...stock-flow adjustment,  $og_{t-k}$ ...output gap

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- Fiscal reaction function:

$$pb_t = f(pb_{t-1}, d_{t-1}, og_{t-k}, X_t)$$

→ 8 CESEEs FE panel, annual data: 1995-2011

- VAR model for non-fiscal determinants of debt:

$$(r_t^f, r_t, g_t, \Delta z_t) = f(r_{t-1}^f, r_{t-1}, g_{t-1}, \Delta z_{t-1})$$

→ 4 CEEs, individual models, quarterly data: 1995-2011

- 1000 simulations for 5 years (2012-2016) → debt paths distribution → 'fan-chart'

## 2. Average Fiscal Policy Patterns: Fiscal Reaction Function

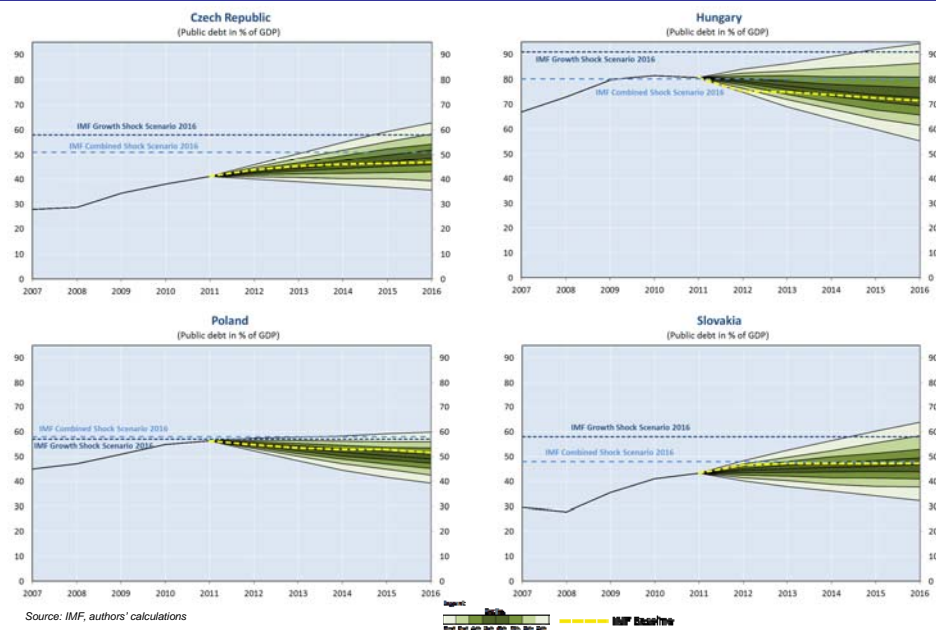
### Fiscal Reaction Function Estimates

Dependent variable: primary balance as % of GDP	Fixed Effects baseline	Fixed Effects boom vs. recession	Fixed Effects nonlinearities	Fiscal Policy:
First lag primary balance ratio	0.301*** [0.045]	0.297*** [0.049]	0.300*** [0.049]	→ persistent
Second lag primary balance ratio				
First lag debt ratio	0.053**	0.055**	0.060	→ reacts to debt (with correction)
Lagged debt spline (40%)			-0.011	
Output gap (Hodrick-Prescott)	0.322**		0.324**	→ 'counter-cyclical'
First lag OG (HP)	-0.156*		-0.150**	→ 'pro-cyclical' with a lag
Positive OG (HP)		0.486*		
First lag of positive OG (HP)		-0.234*		
Negative OG (HP)		-0.003		
First lag of negative OG (HP)		-0.094		
CPI-inflation	0.083*	0.082*	0.084*	
Crisis dummy	-1.089*	-1.235**	-1.087*	
Constant	-3.305**	-3.562**	-3.489**	→ deficit-biased
Observations	116	116	116	
(Overall) R-squared	0.503	0.508	0.498	
Hansenp				
ar1p				
ar2p				
No of collapsed instruments				

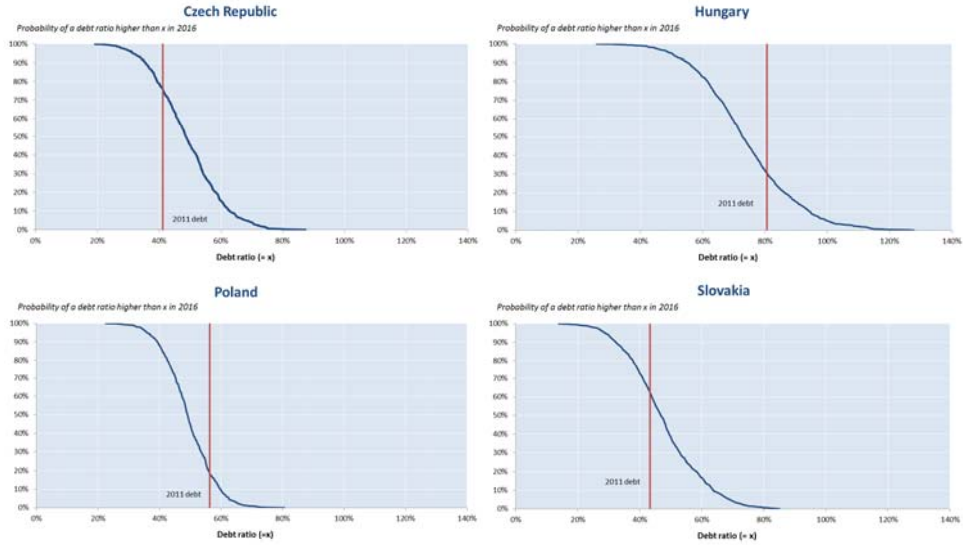
Robust standard errors in brackets, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

### 3. Baseline Results vs. Alternative Scenarios

### Stochastic DSA (Baseline Results) vs. Deterministic DSA



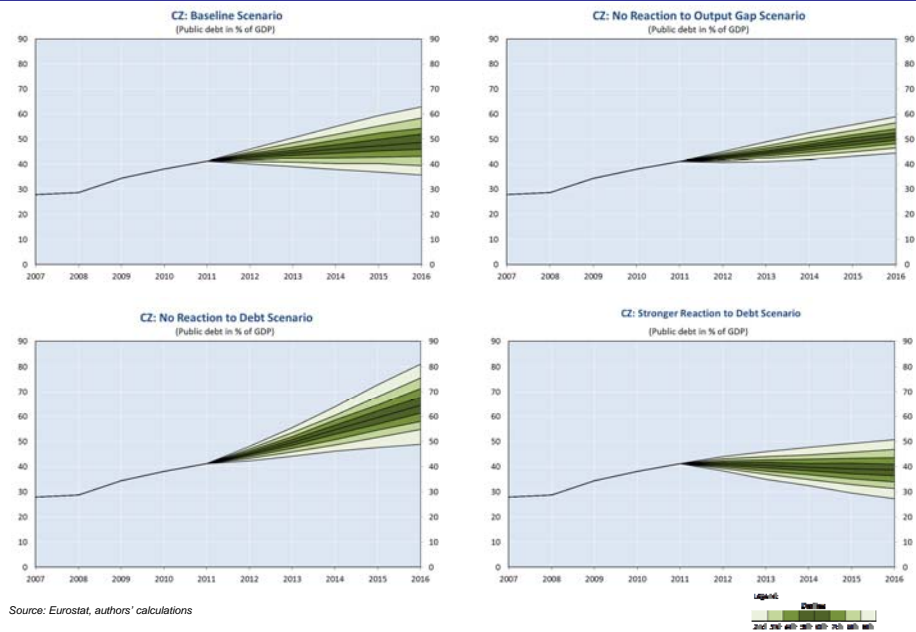
## Empirical Probabilities for the Debt Ratio to Exceed Given Values by 2016



Source: Eurostat, authors' calculations

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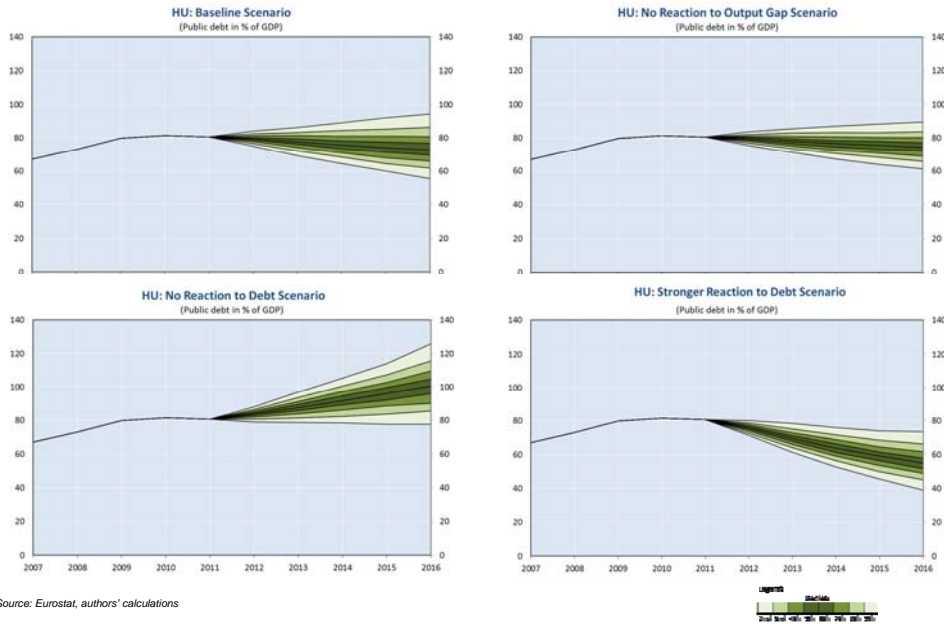
## Baseline Results vs. Alternative Scenarios: Czech Republic



Source: Eurostat, authors' calculations

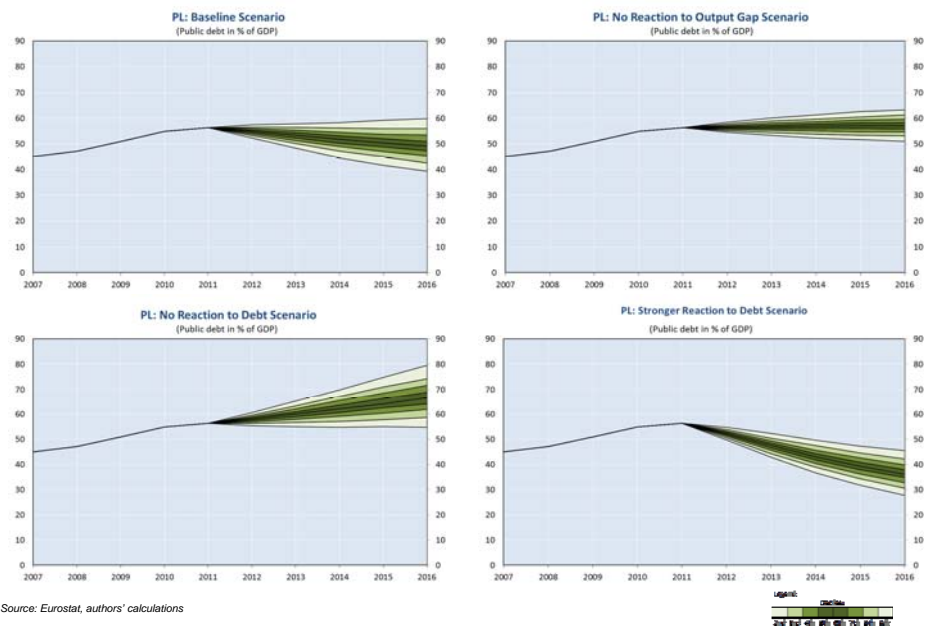
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## Baseline Results vs. Alternative Scenarios: Hungary



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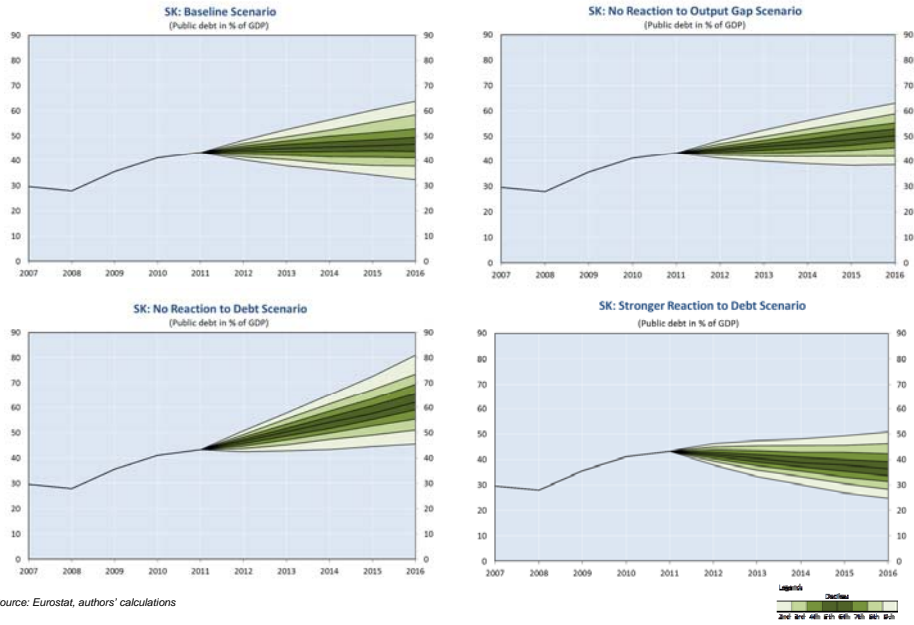
## Baseline Results vs. Alternative Scenarios: Poland



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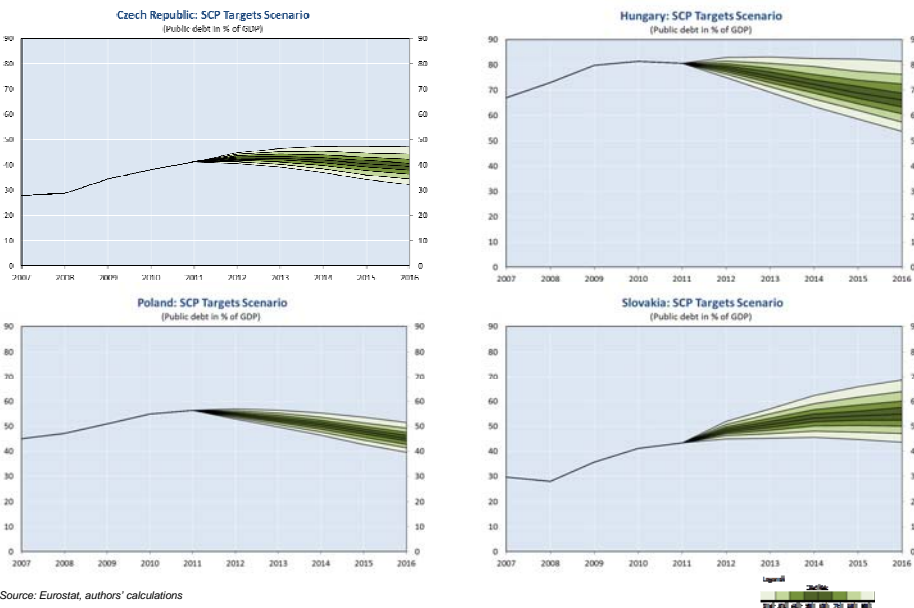


## Baseline Results vs. Alternative Scenarios: Slovakia



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## Stability and Convergence Programmes (SCP) Targets Scenario



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## 4. Summary

### Country Results & Policy Conclusions I.

- In our panel of CESEE countries, **the primary balance** reacts:
  - With persistence
  - In a debt-correcting manner
  - Counter-cyclically
- **Median debt projections suggest sustainability** (non-explosive debt paths). However, its **achievement is still subject to notable risks:**
  - Highest probability of an increasing debt ratio from 2012 until 2016 in the *Czech Rep.* and *Slovakia* (but still below 75%)
  - Although *Hungary* shows a decreasing median debt path, there is a probability of at least 30% that the debt ratio increases until 2016.
  - The probability that *Poland* surpasses the 60% debt-to-GDP threshold until 2016 is rather small (at most 10%)

## Country Results & Policy Conclusions II.

- Impact of different policy scenarios
  - **Acyclical fiscal policy reduces uncertainty**, but leads to **somewhat larger median debt projections** (e.g. due to deficit bias).
  - A policy that does **not take debt developments into account** leads to a **clearly larger probability of exploding debt** paths.
  - In turn, if countries put **more weight on debt stabilization** than in the past, their mean **debt ratios can be squeezed rather quickly** to moderate levels.
  - **Complying with the defined Stability and Convergence Programmes targets limits the overall risks** to the debt outturns and reduces debt ratios in most countries.
- Probability distribution of future debt realizations captures **interactions among the macroeconomic and fiscal variables being shocked**
  - A more plausible range of risks depicted → allows for a better-informed policy reaction should these risks materialize

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## Concluding Remarks

- **Value added**
  - First S-DSA explicitly for CESEE countries → appropriate to account for intrinsic economic volatilities in emerging market economies
  - Augmented approach of Celasun et al. (2007): we account for a wider set of fiscal policy determinants and for possible non-stationarity of the time series; calibration of Fiscal Reaction Function for alternative scenarios
- Some **caveats** for the S-DSA methodology → further research necessary
  - Lack of feedback from fiscal policy to the macro environment (e.g. fiscal multipliers or reaction of interest rates via risk premia)
  - Model and parameter uncertainty not yet captured in the fan charts
  - Shocks are drawn from a normal distribution: asymmetry or fat tail events not captured

Paper URL: [http://www.oenb.at/de/img/feei\\_2012\\_q4\\_studies\\_eller\\_urvova\\_tcm14-251595.pdf](http://www.oenb.at/de/img/feei_2012_q4_studies_eller_urvova_tcm14-251595.pdf)

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**Thank you.**