



Sinaia, October 21st, 2016

Analysis of saving behaviour: the role of precautionary motives and ambiguity

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The opinions expressed in this paper/presentation are those of the authors and do not necessarily reflect the views of the National Bank of Romania.

Presentation outline

- Motivation
- Current environment
- Investigation of precautionary motives phenomena
- Precautionary savings and interest rates
- Conclusions

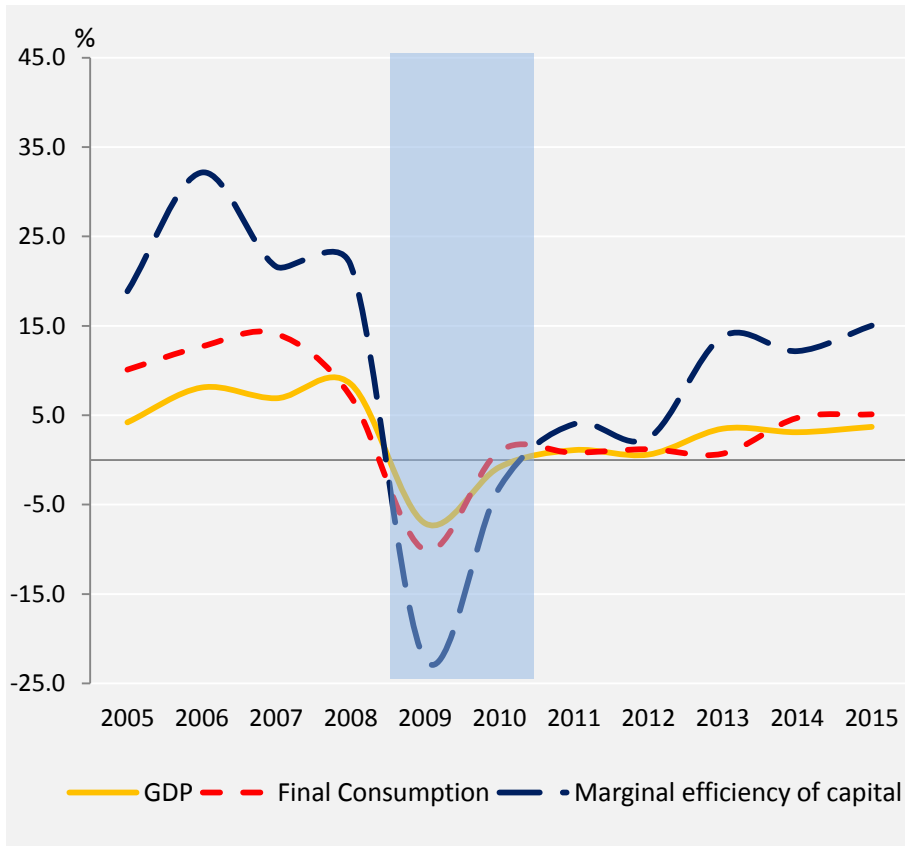
Motivation

- Kind of new-normal in consumption-saving-investment problem: Bernanke's (2005) *saving glut* stylized fact
- Still no clear consensus on two major topics related to consumption/saving/investment problem:
 - i) Saving and Growth: the sense of causality?
 - ii) Precautionary motives: complex concept of significant importance for modelling as well as for predictions and lessons
- Need for a proper understanding of the role of precautionary savings in the current macro-financial environment

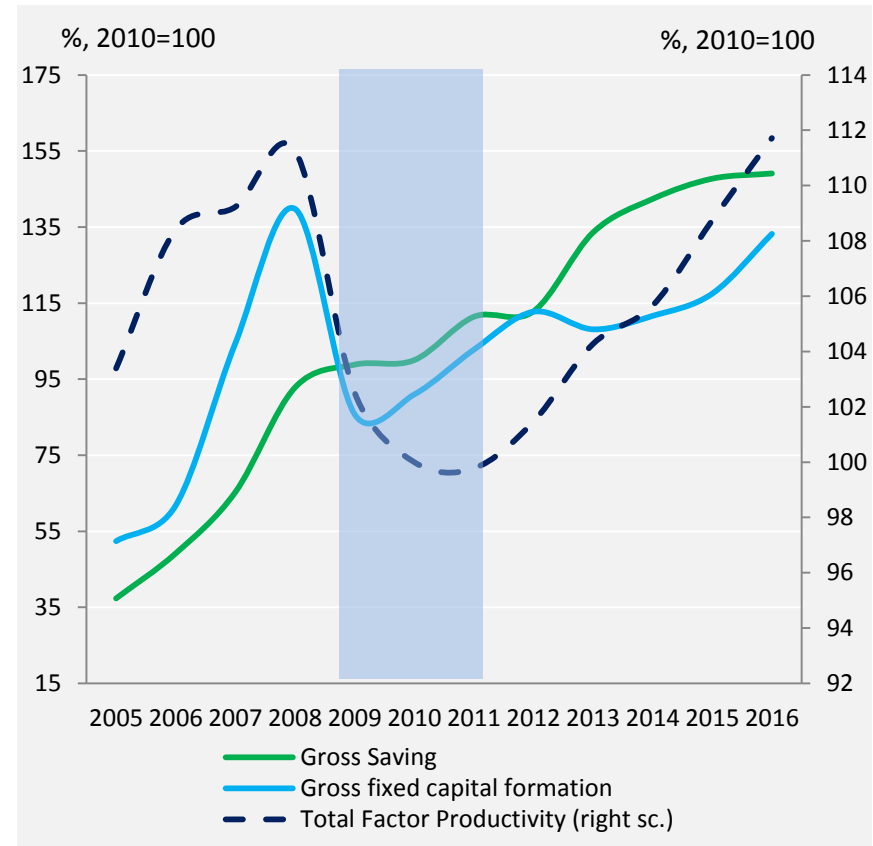
Current environment

Current environment: a macro-financial snapshot

➤ Dynamics of Romanian macro-financial key variables were significantly affected by the financial crisis

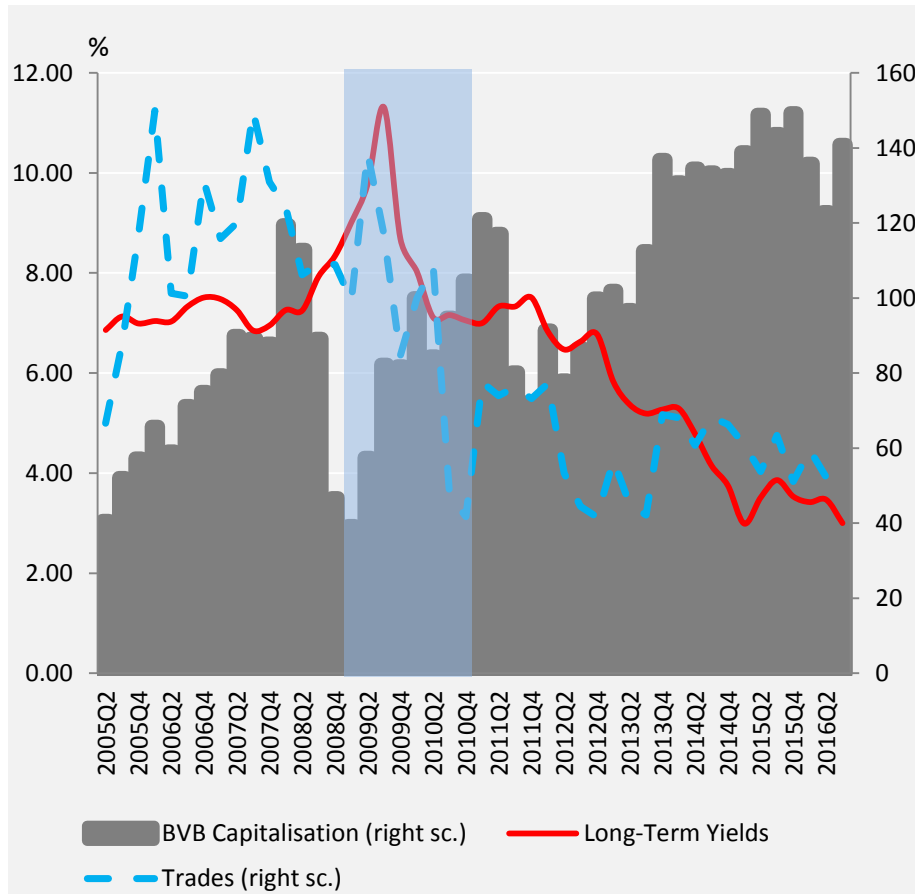


Source: Ameco, Eurostat



Source: Ameco

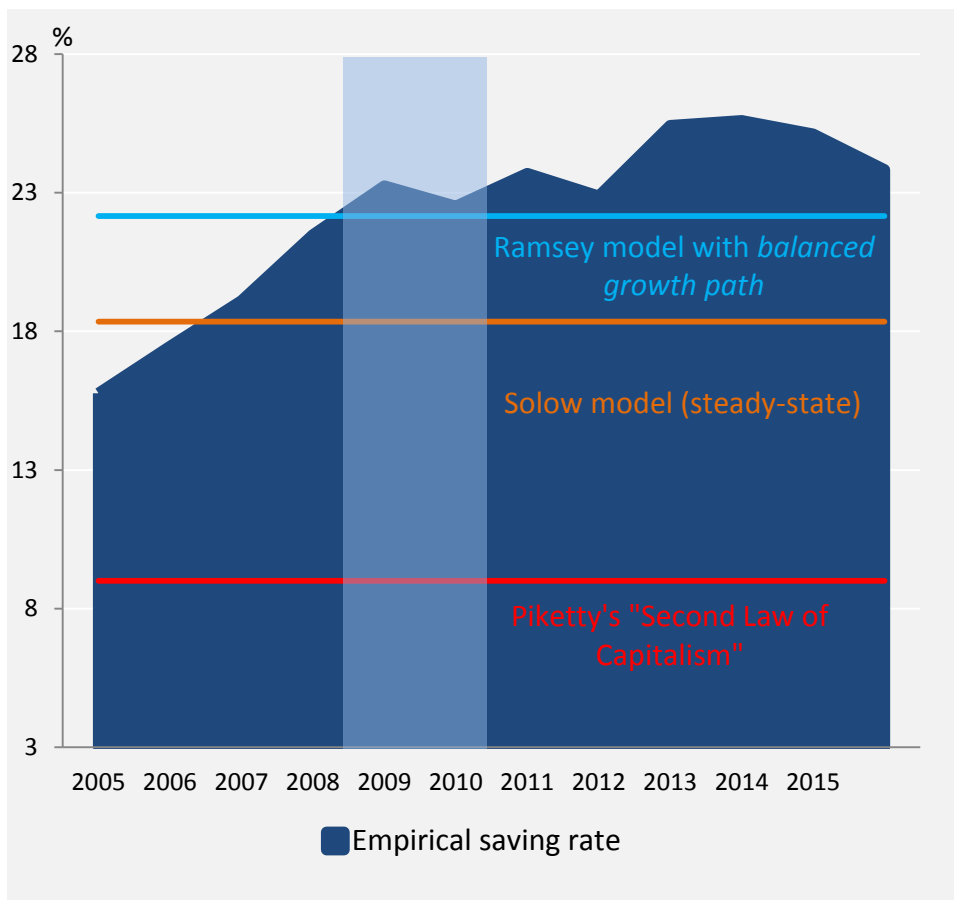
Current environment: a macro-financial snapshot (2)



- After 2012, savings increased at a higher pace than gross investments
- ...even if real activity intensified and the marginal efficiency of capital improved considerable
- In the same timeframe, TFP manifested a significant upward trend

Source: BSE, Eurostat

Current environment: a link with standard theory



Source: Ameco, own calculations

- Saving rate has located on a pronounced upward tendency in the crisis' aftermath
- Levels of the saving rate determined on the base of different theoretical models are fairly outperformed by empirical observations (dynamic inefficiency?)
- This brings up the question on the incidence of precautionary savings

Investigation of precautionary motives phenomena

Investigation of precautionary motives phenomena: a two-stage strategy

- ❑ First stage aims to infer information on the presence of precautionary motives within the decision making process
- ❑ Second stage is focused on the influence of risk/uncertainty facts on consumption decisions by running the following steps:
 - formulation of a structural model (with features similar to those used in the first stage) designed to incorporate risk and uncertainty within the decision making process
 - formulation of an econometric model designed to infer information on the risk and uncertainty in the consumption/saving dynamics
 - a comparison between the results from the two previous steps

Investigation of precautionary motives phenomena: stage I

- Use of a structural model for the optimal consumption/saving decision problem endowed with CARA type preferences in order to allow for precautionary motives for savings (similar to *Malley and Molana, 2002*)

Closed form solution

measure of
precautionary saving

income innovations

$$\underbrace{(C_t - hC_{t-1})}_{\text{consumption dynamics}} = \underbrace{\Psi}_{\text{measure of precautionary saving}} + \underbrace{\rho(C_{t-1} - hC_{t-2})}_{\text{lagged consumption dynamics}} + \underbrace{\eta\zeta_t}_{\text{income innovations}} \quad [1]$$

consumption dynamics

lagged consumption
dynamics

Investigation of precautionary motives phenomena: stage I – results

- Obtained estimates for different versions of the basic model emphasizes the presence of precautionary motives for savings (Model II in red provides the best fit)

	Models				
	(I)	(II)	(III)	(IV)	(V)
Regressors	Coefficient Estimates				
Intercept Ψ	1.4399 (0.0004)	1.6007 (0.0003)	0.1799 (0.8413)	2.2150 (0.0000)	3.6066 (0.0118)
ΔC_{t-1}	-	-0.1783 (0.1352)	-0.2333 (0.0599)	0.2014 (0.0563)	-0.1979 (0.0924)
ζ_t	0.5929 (0.0000)	0.6589 (0.0000)	0.62999 (0.0001)	0.5182 (0.0003)	0.5725 (0.0021)
ΔY_{t-1}	0.4413 (0.0011)	0.5619 (0.0016)	1.0809 (0.0010)	-	0.4463 (0.0219)
ζ_{t-1}	-	-	-0.5583 (0.1885)	-	-
Linear trend	-	-	-	-	-0.0434 (0.0895)
Wald Test for $\Psi_t = 0$ (p-value)	0.0004	0.0003	0.8413	0.0000	0.0118
\bar{R}^2	0.4214	0.4265	0.4765	0.2795	0.4398

Investigation of precautionary motives phenomena: stage II – structural model

- Use of a two-period structural model for the optimal consumption/saving decision problem, endowed with CARA preferences and a multiple-priors specification for utility in order to allow for *Knightsian uncertainty* (similar to *Miao, 2004*)

Closed form solution

$$\underbrace{C_0 - \mu}_{\text{demeaned consumption}} = \underbrace{\frac{R(Y_0 - \mu)}{1 + R + h}}_{\text{demeaned income}} - \underbrace{\frac{\log \beta R + h \mu}{\gamma(1 + R + h)}}_{\text{constant}} - \underbrace{\frac{\gamma \sigma^2}{1 + R + h}}_{\text{riskiness (volatility)}} - \underbrace{\frac{\sigma \sqrt{2\phi}}{1 + R + h}}_{\text{uncertainty}} \quad [2]$$

precautionary savings due to income:

Investigation of precautionary motives phenomena: stage II – econometric model

- To nest the previous two models, an econometric model with time varying parameters and volatility and with a Markov-switching specification for the state variables was applied – in order to allow for risk and uncertainty in an econometric sense (similar to *Kim and Nelson, 1999*)

Model

precautionary savings

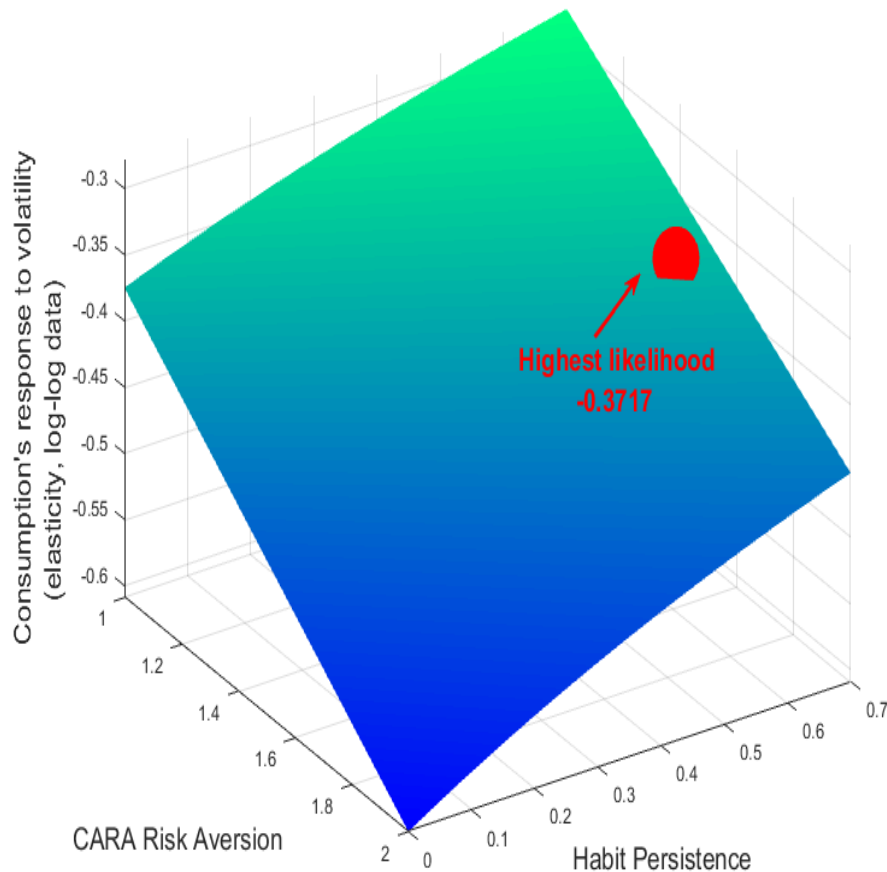
innovations in income and consumption

$$\Delta C_t = \Psi_t + \beta_{1,t} \Delta C_{t-1} + \beta_{3,t} \Delta Y_{t-1} + \beta_{2,t} \zeta_t + \varepsilon_t \quad [3]$$

consumption growth

lagged consumption and income growth

Investigation of precautionary motives phenomena: stage II – results



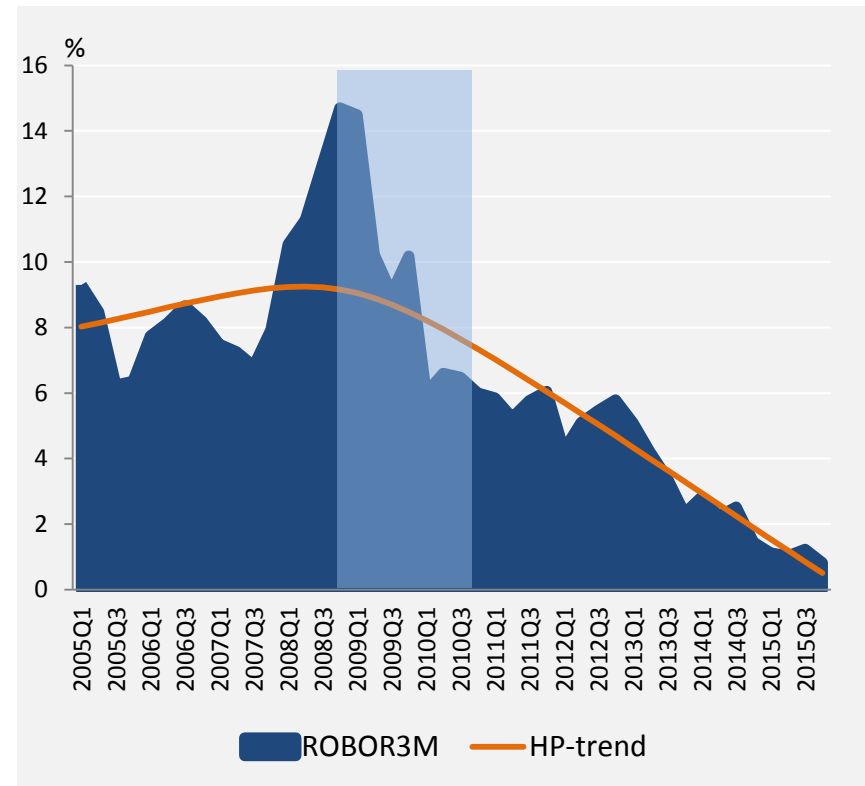
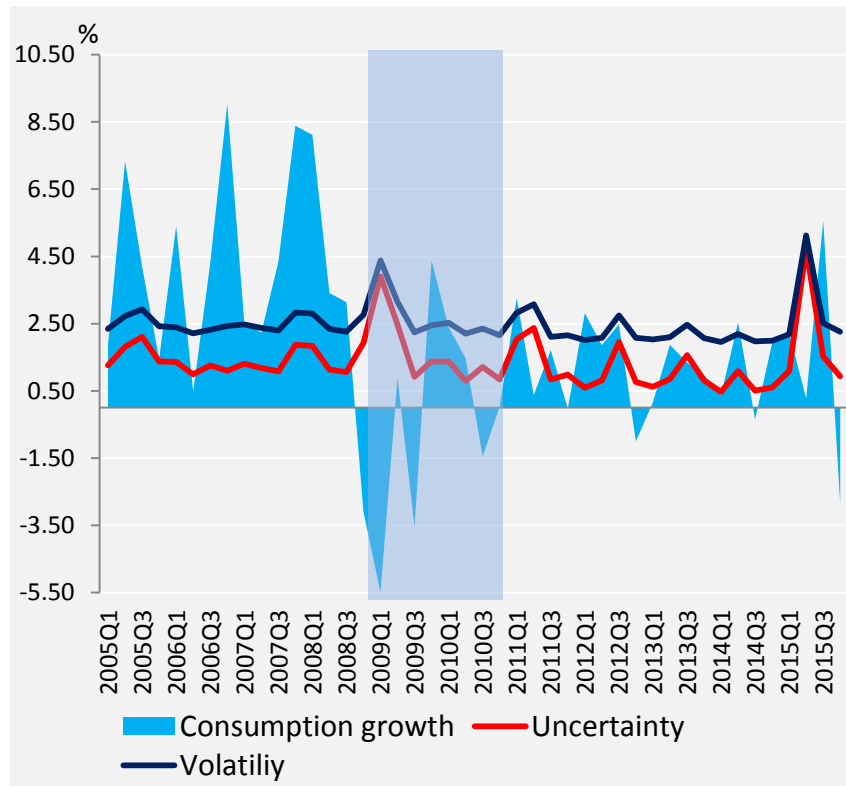
- Calibration of the structural model (left plot) underlined:
 - ❑ a significant sensitivity of consumption to volatility and uncertainty – econometric model stressed the same
 - ❑ higher and more nonlinear sensitivity to volatility than uncertainty
 - ❑ sensitivity is more increasing in risk aversion than consumption rigidity (habit persistence)

Source: model calibration, own calculations

Precautionary savings and interest rates

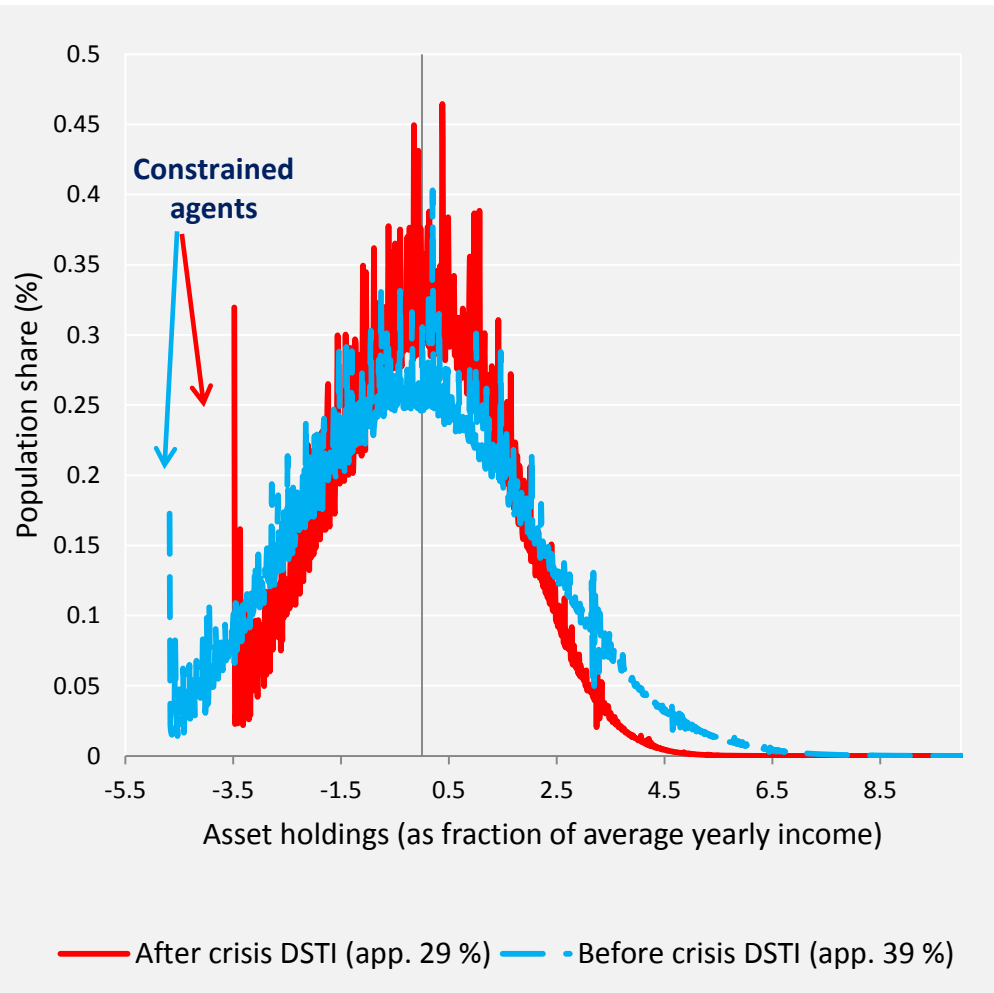
Precautionary savings and interest rates

- In the post-crisis period, an increased magnitude of ambiguity' fluctuations (uncertainty and volatility) as well as a steeper tendency in short-term rates can be observed



Source: Eurostat, own calculations

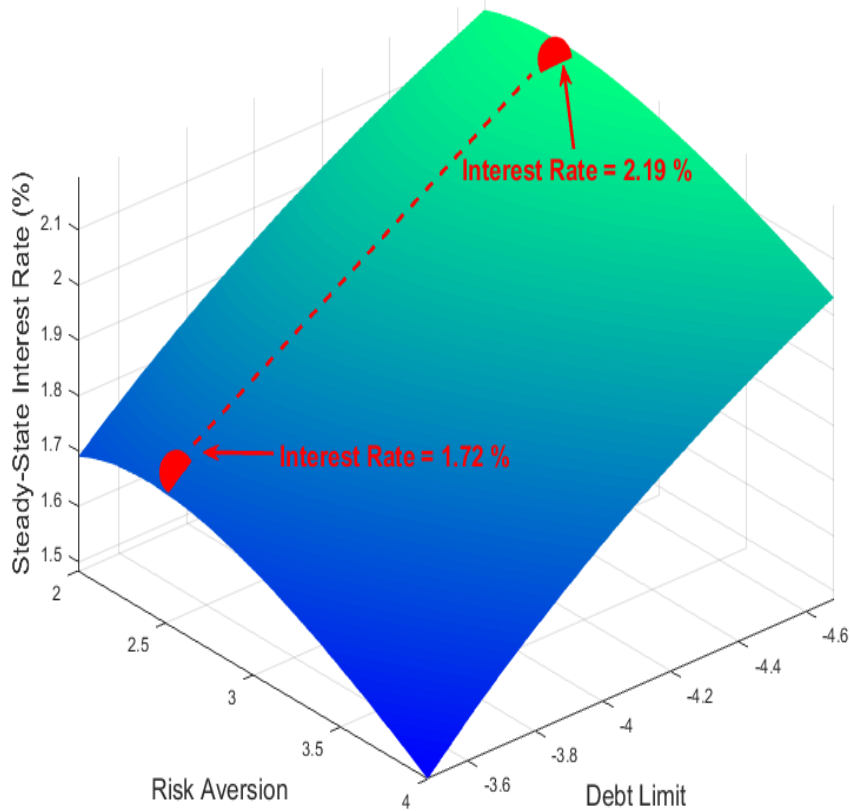
Precautionary savings and interest rates (2)



- A self-insurance model (*Bewley-Huggett-Aiyagari*) with heterogeneous agents, idiosyncratic shocks, CRRA preferences and borrowing constraints was used
- By calibration and then simulation, results (left plot) showed that:
 - ☐ financial crisis (through a credit crunch) determined a higher concentration in the debt limit ➡ premises for precautionary savings

Source: model simulation, own calculations

Precautionary savings and interest rates (3)



- ☐tightness in credit limits, reduction of debt and the build-up of a buffer stock of savings generates a drop in the equilibrium interest rate
- ☐ people from the bottom of distribution have a stronger incentive to save
- ☐ reduction of interest rates is increasing in the debt limit and the risk aversion and is more non-linear in the later

Source: model simulation, own calculations

Conclusions

- Incidence of the precautionary motives for saving in Romanian economy is highly probable and it is strongly related to uncertainty and volatility
- Sharp contraction of consumption from 2009 was connected with increases in volatility (risk) and uncertainty
- Standard theory on economic growth fails to fully explain the recent dynamics of Romanian saving
- In the face of a credit crunch, precautionary savings could contribute to a decrease in interest rates



Thank you for
your attention!