Universität Bielefeld

Department of Business Administration and Economics

Research Seminar

Bucharest University of Economic Studies, Bucharest, Romania, March 1, 2016

Public finances and economic growth

Bettina Bökemeier

(Birth name: Fincke)

Department of Business Administration and Economics

Bielefeld University

33501 Bielefeld, Germany

Outline

Talk based on:

Part I (EMU+ US):

Fincke & Greiner (2015) On the relation between public debt and economic growth: an empirical investigation, *Economics and Business Letters,* Vol 4, No 4 (2015): Special Issue Debt and Sustainability

Part II (EM):

Fincke & Greiner (2015) Public Debt and Economic Growth in Emerging Market Economies, *South African Journal of Economics*, Vol. 83(3), pp. 357-370

Part III (CEECs):

Bökemeier (2015) Economic Growth and the Public Deficit in EU Member States in Central and Eastern Europe, *Romanian Journal of Fiscal Policy*, Vol.6, Issue 1(10)

Outline

1. Introduction
2. Estimations for EMU + US *(EBL-Paper)*
3. Extention to Emerging Markets *(SAJE-Paper)*
4. Adaption to CEECs *(RJFP-Paper)*
5. Conclusion

1. Introduction

Topicality:

- financial crisis
- public debt crisis Europe
- economic stabilization increased debt ratios
- European Integration

1. Introduction

Literature contributions I.

Public finances and economic growth: public debt

- inverted u-shape/ threshold:

  Reinhart and Rogroff (2010)

  Caner et al. (2010)

  Checherita and Rother (2010)

  Egert (2012)

1. Introduction

Literature contributions II.

- negative correlation:

  Ferreira (2009)

  Kumar and Woo (2010)

  Ballasone et al. (2011)

1. Introduction

RQ: How does public debt affect economic growth?

today's proceeding:

- panel estimation
- selected EU economies + USA
- check for possible non-linearities

2. Empirics

2.1 Data

- Countries:

  Austria, France, Germany, Italy, the Netherlands, Portugal and the USA

- Annnual data for 1970 - 2012

- Growth:

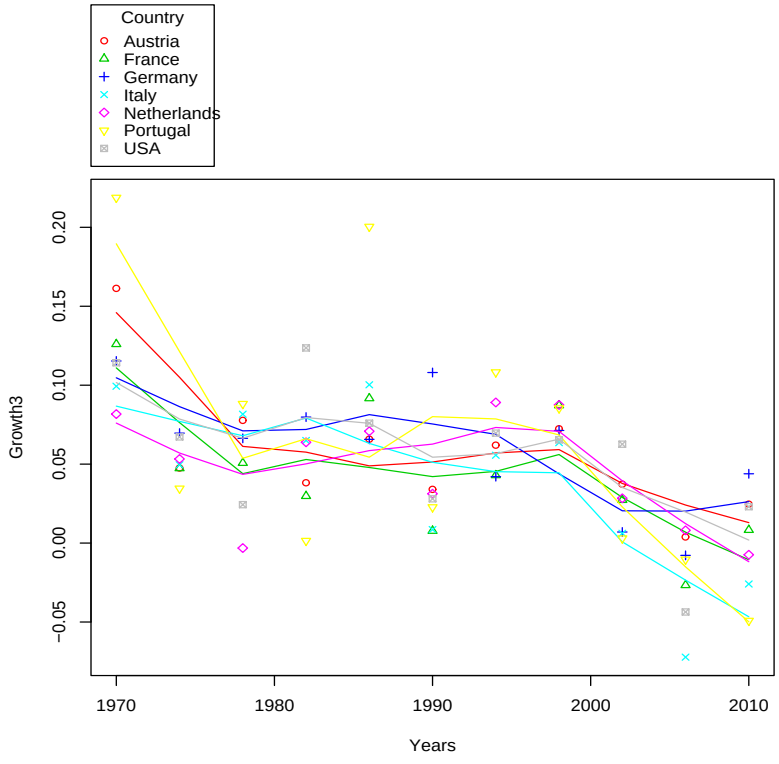
  sub-periods: non-overlapping intervals,

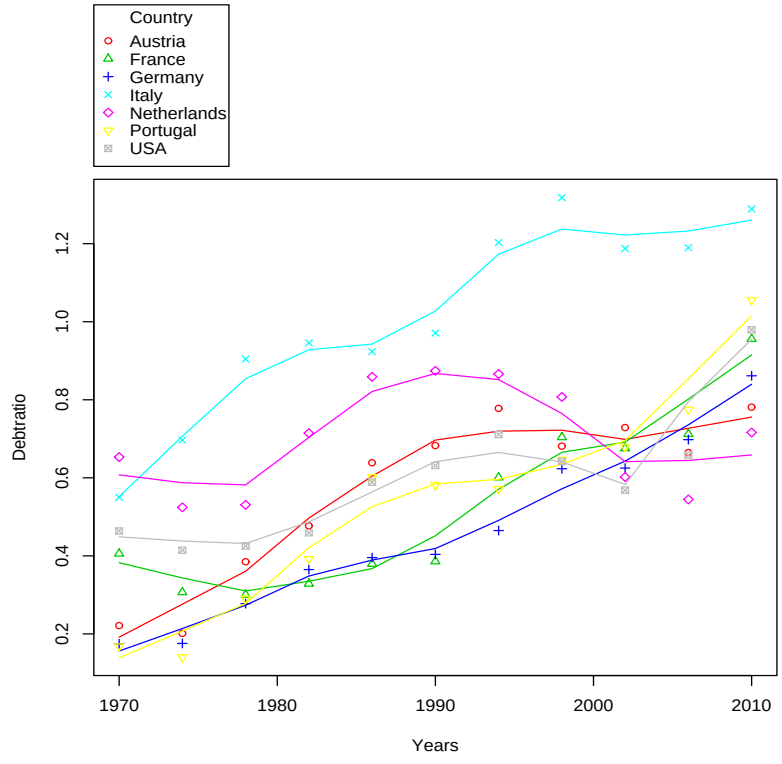
  (five years $q = 5$, three years $q = 3$ and one year $q = 1$),

  for $q = 5$: (1970-1975), (1976-1981), ... , (2006-2011)

2. Empirics

2.1 Data





2. Empirics

2.2 Methodology

Regression model (as in Kumar and Woo (2010)):

$$y_{i,t} - y_{i,t-q} = \phi_0 + \psi\, b_{i,t-q} + \sum_j \phi_j\, C_{j,i,t-q} + \epsilon_{i,t} \qquad (1)$$

y: ln of real GDP per capita

b: public debt to GDP ratio

C: vector of the additional variables

$y_{i,t-q}$: initial real GDP per capita, $Trade_{i,t-q}$: foreign trade

$GCons_{i,t-q}$: government consumption, $Infl_{i,t-q}$: inflation

2. Empirics

2.3 Results I

	pooled model		
	$q = 5$ $(N = 49)$	$q = 3$ $(N = 77)$	$q = 1$ $(N = 294)$
Constant	0.139***	0.100***	0.029***
b_{t-q}	- 0.089 **	- 0.076***	- 0.018***
R^2(adj)	0.16	0.16	0.04
DW	1.72	2.26	1.62
	fixed effects model		
	$q = 5$	$q = 3$	$q = 1$
b_{t-q}	- 0.132 **	- 0.104***	- 0.025***
R^2(adj)	0.16	0.17	0.04
DW	1.96	2.40	1.65
F test	F=0.68, p-val.=0.67	F=0.66, p-val.=0.69	F=0.75, p-val.=0.61
	random effects model		
	$q = 5$	$q = 3$	$q = 1$
Constant	0.149***	0.107***	0.031***
b_{t-q}	- 0.105 **	- 0.087***	- 0.020***
R^2(adj)	0.16	0.17	0.04
DW	1.80	2.31	1.63
Hausman test	$\chi^2 = 1.03$ p-val.=0.31	$\chi^2 = 1.49$ p-val.=0.22	$\chi^2 = 1.46$ p-val.=0.23
***(0.1% level)	**(1% level)	*(5% level)	•(10% level)

Table 1: Plain panel estimation results.

2. Empirics

2.3 Results I

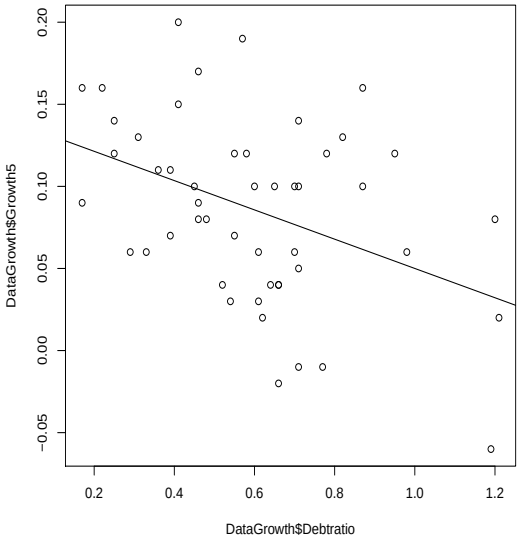


Figure : Pool, $q = 5$.

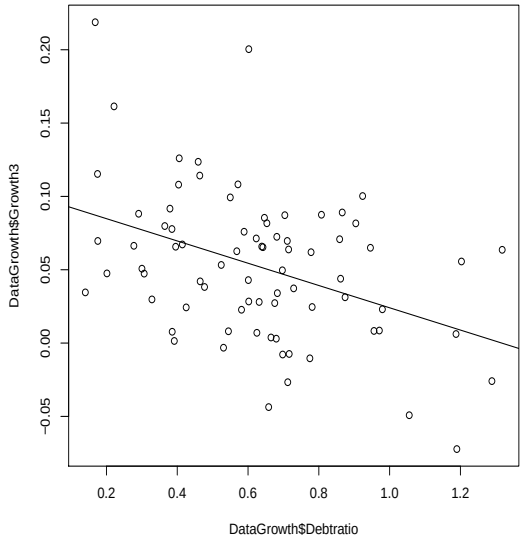


Figure : Pool, $q = 3$.

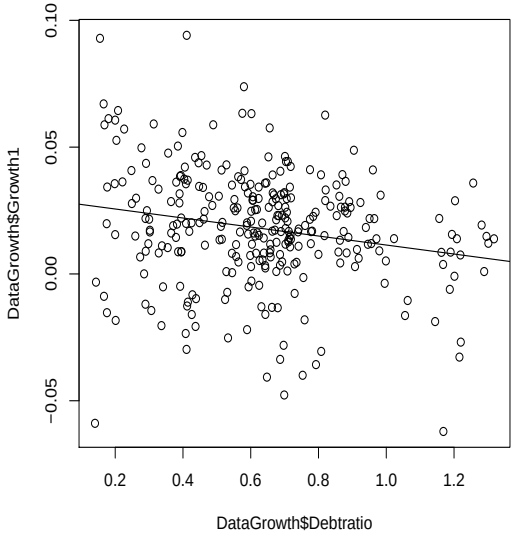


Figure : Pool, $q = 1$.

2. Empirics

2.4 Non-linearities

For studying potential non-linearites:

approximation of the (overall) plain link:

$$y_t - y_{t-q} = s(b_{t-q}) + \epsilon_t \tag{2}$$

	$q = 5 \;\; (N = 49)$	$q = 3 \;\; (N = 77)$	$q = 1 \;\; (N = 294)$
edf	4.12*	1***	1***
R^2(adj)	0.21	0.15	0.04
DW	1.88	2.26	1.62
***(0.1% level)	**(1% level)	*(5% level)	•(10% level)

Table : Spline estimation results, plain model.

2. Empirics

2.4 Non-linearities

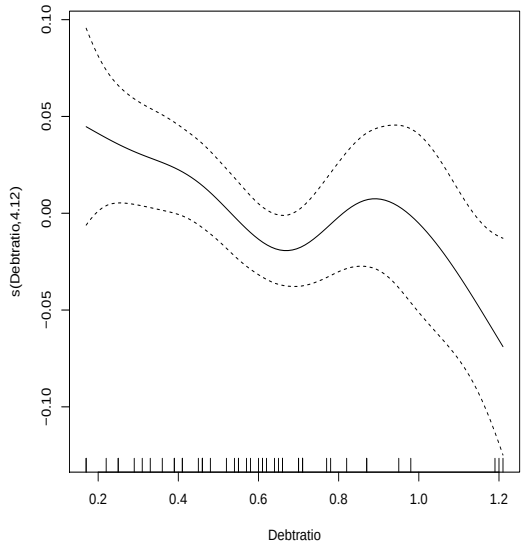


Figure : Spline, $q = 5$.

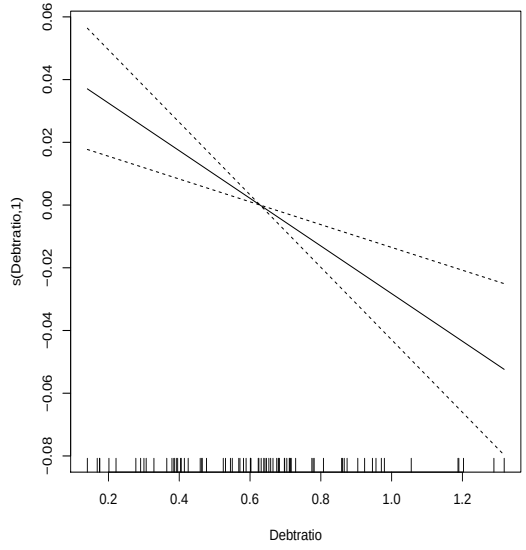


Figure : Spline, $q = 3$.

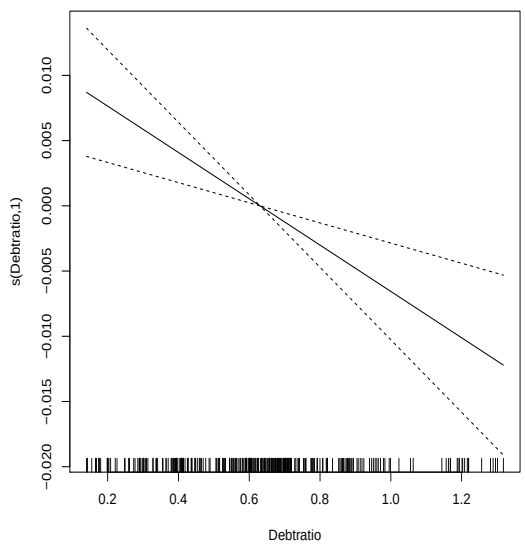


Figure : Spline, $q = 1$.

\+ OLS with higher-order terms (insignificant)

2. Empirics

2.5 Results II

	$q = 5 \quad (N = 49)$	$q = 3 \quad (N = 77)$	$q = 1 \quad (N = 294)$
Constant	0.853 **	0.921***	0.313***
b_{t-q}	- 0.051	- 0.050 *	- 0.012 *
y_{t-q}	- 0.067 *	- 0.072***	- 0.025***
$Trade_{t-q}$	0.193•	0.223***	0.086***
$GCons_{t-q}$	- 0.390	- 0.560 **	- 0.188***
$Infl_{t-q}$	0.029	- 0.194	- 0.093 **
R^2(adj)	0.27	0.39	0.15
DW	1.78	2.02	1.73
***(0.1% level)	**(1% level)	*(5% level)	•(10% level)

Table : Panel estimation results, pooled OLS.

2. Empirics

2.5 Results II

	$q = 5 \quad (N = 49)$	$q = 3 \quad (N = 77)$	$q = 1 \quad (N = 294)$
Constant	1.388***	0.957***	0.324***
b_{t-q}	0.018	- 0.049 *	- 0.011 *
y_{t-q}	- 0.125***	- 0.075***	- 0.026***
$Trade_{t-q}$	0.159	0.225***	0.087***
$GCons_{t-q}$	- 0.399	- 0.582 **	- 0.196***
$Infl_{t-q}$	0.022	- 0.206	- 0.098 **
R^2(adj)	0.36	0.41	0.17
DW	1.75	2.03	1.74
***(0.1% level)	**(1% level)	*(5% level)	•(10% level)

Table : Panel estimation results, random effects.

3. Extention

3.1 Introduction

Extention:

Emerging Market economies

3. Extention

3.1 Introduction

Emerging markets topicality II:

- tight economic inter-relations and integration:
  influenced other countries worldwide amongst them
  many emerging market economies (EM)
- EM find themselves in times of trouble recently
- China's growth performance declines
- severe drop of currencies starting in 2013 continued in 2014:
  Brazil's Real, Thailand's Baht, Turkish Lira, South African Rand

3. Extention

3.1 Introduction

Research question extended:

How does public debt affect growth in EM?

similar RQ but with focus on

- debt and growth relationship
- emerging market economies

3. Extention

3.2 Specifics of emerging markets

demarcation of emerging markets

- many ways to classify EM

  HOWEVER: no clear cut definition!

- for our approach:

  essential property: outstanding growth performance

3. Extention

3.2 Specifics of emerging markets

choice of countries:

- study includes eight EM:

  Brazil, India, Indonesia, Malaysia, Mexico, South Africa, Thailand, Turkey

- not considered:

  Russia and China (part of 'BRICS' states)

  due to data availability

3. Extention

3.3 Data

data set:

- Annual data for 1980 - 2012
- Growth: sub-periods of non-overlapping intervals,

  (five years $q = 5$ and three years $q = 3$),

  for $q = 5$: (1980-1985), ... , (2004-2009), (2010-2012)

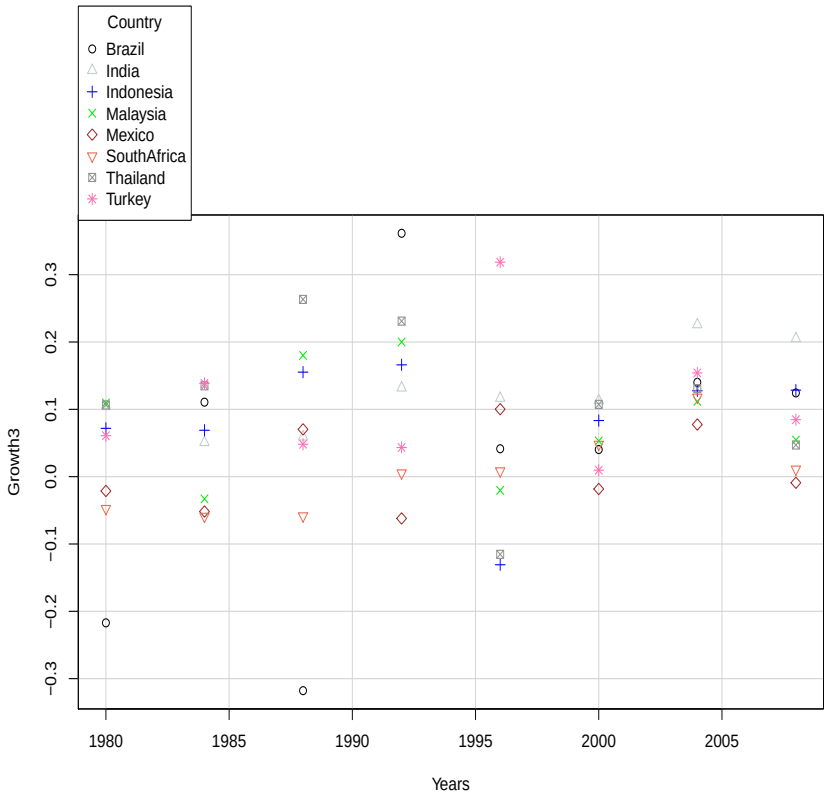
  for $q = 3$: (1980-1983), ... , (2008-2011)
- Sources:

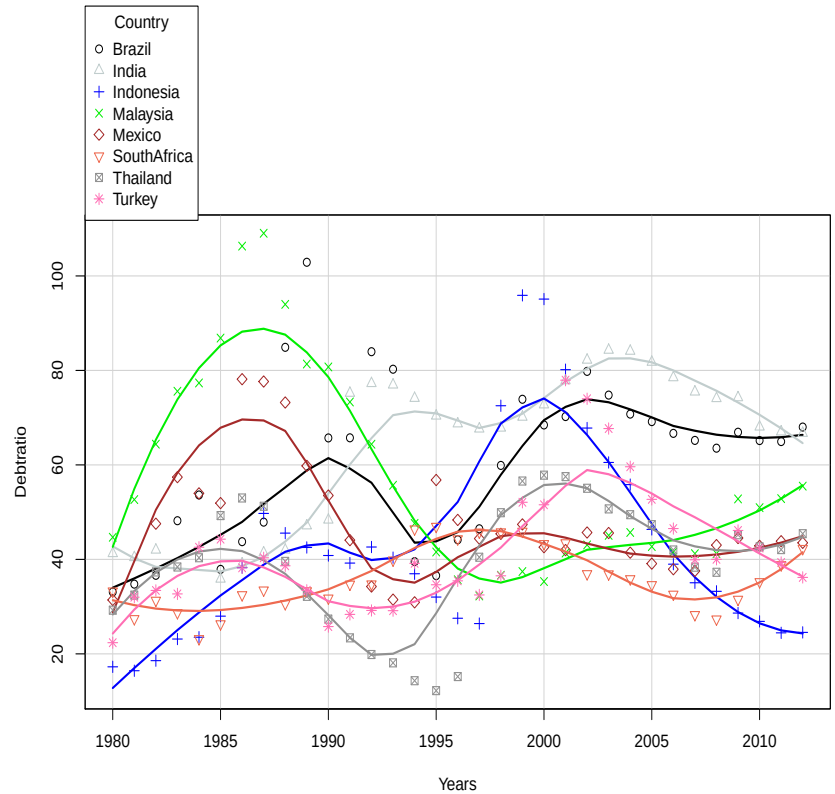
  IMF, World Bank, OECD and Abbas et al. (2010) (Debt)

3. Extention

3.2 Specifics of emerging markets

impression of growth performance and debt ratio:





3. Extention

3.4 Methodology

Regression model (as in Kumar and Woo (2010)):

$$y_{i,t} - y_{i,t-q} = \phi_0 + \psi\, b_{i,t-q} + \sum_j \phi_j Z_{j,i,t-q} + \epsilon_{i,t} \qquad (3)$$

y: ln of real GDP per capita

b: public debt to GDP ratio

Z: vector of the additional variables

$y_{i,t-q}$: initial real GDP per capita, $Trade_{i,t-q}$: foreign trade

$Inv_{i,t-q}$: investment, $Infl_{i,t-q}$: inflation,

$Exch_{i,t-q}$: exchange rate, $Pop_{i,t-q}$: population

3. Extention

3.5 Results I

5 years growth:

	fixed effects	**random effects**
Constant		- 0.2341
b_{t-5}	0.0028**	0.0028**
Pop_{t-5}	0.4663**	- 0.0141
y_{t-5}	- 0.3150**	0.0140
Inv_{t-5}	0.0078•	0.0060
$Infl_{t-5}$	0.0001	0.0002
$Trade_{t-5}$	- 0.0003	- 0.0032
$Exch_{t-5}$	$- 1.48 \cdot 10^{-5}$	$- 8.56 \cdot 10^{-6}$
R^2(adj)	0.40	0.25
DW	2.50	1.78
	Hausman	**Test**
	$\chi^2 = 22.07$	p-val.=0.0025
	Significance	**levels**
**(1% level)	*(5% level)	•(10% level)

Table 1: Estimation results, $q = 5$, eight countries (N=48).

3. Extention

3.5 Results II

3 years growth:

	fixed effects	**random effects**
Constant		0.2150
b_{t-3}	0.0015$^{\bullet}$	0.0015$^{\bullet}$
Pop_{t-3}	0.4589**	0.3161**
y_{t-3}	- 0.2550**	- 0.1557*
Inv_{t-3}	0.0016	- 0.0009
$Infl_{t-3}$	$-1.91 \cdot 10^{-5}$	$2.20 \cdot 10^{-5}$
$Trade_{t-3}$	0.0010	- 0.0011
$Exch_{t-3}$	$-1.77 \cdot 10^{-6}$	$-2.17 \cdot 10^{-6}$
R^2(adj)	0.21	0.20
DW	2.66	2.58
	Hausman	**Test**
	$\chi^2 = 3.05$	p-val.=0.8802
	Significance	**levels**
**(1% level)	*(5% level)	$^{\bullet}$(10% level)

Table 1: Estimation results, $q = 3$, eight countries (N=64).

3. Extention

3.5 Results III

Reasoning of positive correlation in EM:

Have EM not reached tipping point of inverted u-shape relationship?

Brazil	Indonesia	India	Mexico	Malaysia	Thailand	Turkey	South Africa
61.0	41.7	64.9	47.4	57.2	39.1	41.7	35.0

Average debt ratios in emerging market economies (1980-2012) in %.

France	Germany	Italy	US
59.4	55.4	111.0	65.7

Average debt ratios in selected other economies (1980-2012) in %.

4. Adaption to CEECs

4.1 Introduction

Adaption:

Central and Eastern European Countries

4. Adaption to CEECs

4.1 Introduction

Central and Eastern European Countries:

- transition economies: high growth performances ($\overline{y}$= 4%)
- 2004 accession: 8 CEECs joined
- however, also find themselves in times of trouble recently

4. Adaption to CEECs

4.1 Introduction

Literature contributions on debt and growth in CEECs:

- Čeh Časni et al (2014)
- Mencinger et al. (2014)

$\rightarrow$ this analysis similar direction with focus on 2004 accession

4. Adaption to CEECs

4.1 Introduction

Research question adapted:

How did public finance situation affect growth in 2004 accession CEECs?

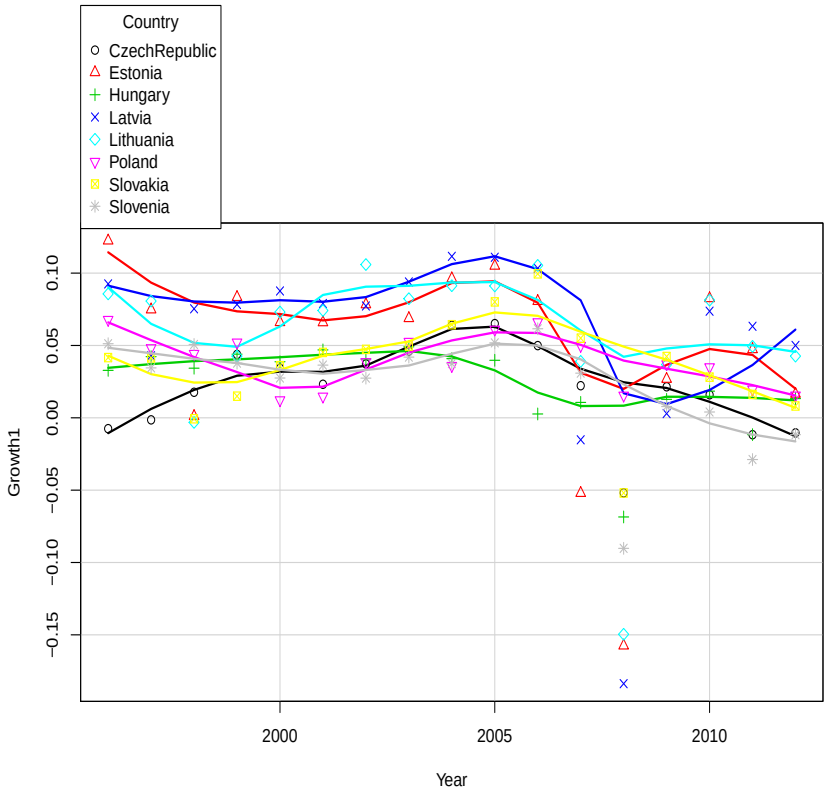
Did EU membership change this behavior? And if so - how?

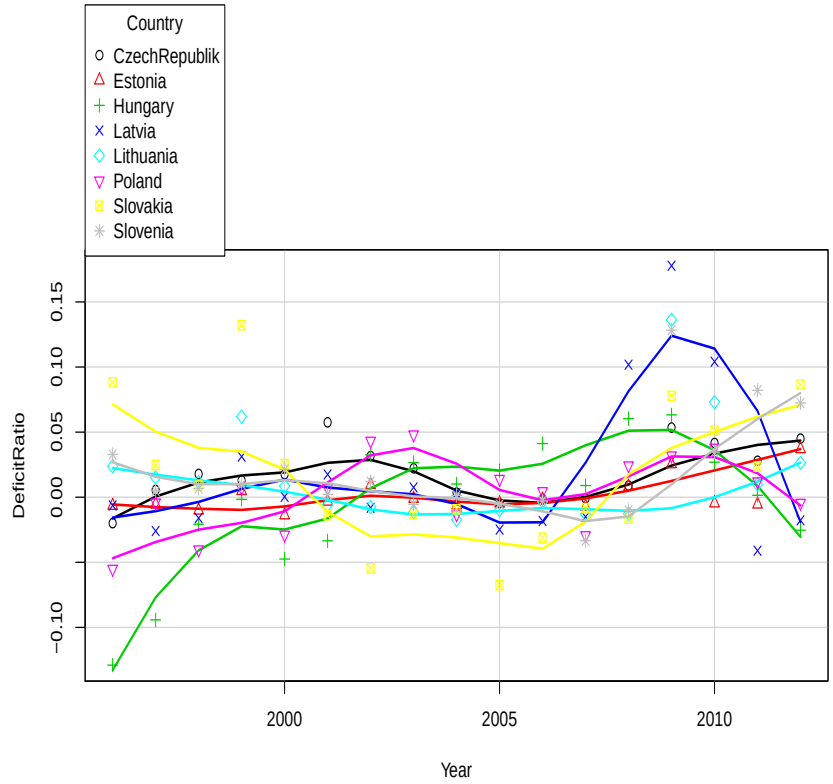
- panel estimation, annual data 1996 - 2012
- eight 2004 accession countries: Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia
- public fincance variable $\rightarrow$ deficit ratio

4. Adaption to CEECs

4.2 Estimations

impression of growth performance and budget deficit situation:





4. Adaption to CEECs

4.2 Estimations

Regression as in Kumar and Woo (2010) or Mencinger et al. (2014):

$$y_{i,t} - y_{i,t-1} = \phi_0 + \sum_j \phi_j Z_{j,i,t-1} + \epsilon_{i,t} \tag{4}$$

y: ln of real GDP per capita (LCU)

Z: vector of the additional variables:

DefRatio: **initial public deficit to GDP Ratio,**

$rGDP_{us}$: initial conditions: log of real GDP per capita in US$,

Infl: mon. policy/ inflation, *GovCon*: State size/ public Cons.

FDI: capital inflows/ Foreign direct investment,

TradeBal: openness/ trade balance,

4. Adaption to CEECs

4.2 Estimations - RESULTS

Result of estimation of equation (4):

```
summary(FE_def)
Coefficients :
                Estimate  Std.Err  t-val  Pr(>|t|)
DefRatio        -0.274    0.103  -2.645   0.009 **
log(rGDP_us)    -0.121    0.023  -5.098 1.2e-06 ***
Inflation       -0.338    0.109  -3.086   0.002 **
GovCons         -0.792    0.360  -2.198   0.029 *
FDI             -0.061    0.059  -1.047   0.296
TradeBal         0.074    0.110   0.679   0.498
---
Signif. codes: *** 0.001 ** 0.01 * 0.05 . 0.1
Adj. R-Squared :  0.24242
```

4. Adaption to CEECs

4.2 Estimations - RESULTS

Result of estimation accounting for 2004 accession:

```
summary(FE_A)
Coefficients :
                    Estimate Std.Err t-val  Pr(>|t|)
I(DefRatio*DBA)   -0.159    0.160  -0.997   0.320
I(DefRatio*DAA)   -0.352    0.132  -2.654   0.009 **
log(rGDP_us)      -0.114    0.024  -4.654 8.38e-06 ***
Inflation         -0.308    0.113  -2.711   0.007 **
GovCons           -0.718    0.369  -1.944   0.054 .
FDI               -0.062    0.059  -1.061   0.290
TradeBal           0.115    0.118   0.973   0.332
---
Adj. R-Squared :  0.24515
```

5. Conclusion

empirical analysis of relationship between public finance situation and subsequent economic growth

- based on panel estimations with annual data
- 3 groups of countries (Euro+US, EM, CEECs)
- distinction between different growth intervals
  (5-years growth, 3-years growth, annual growth)
- results supported by diverse specifications
  (public finance variable, time intervals, regression model, controlls)
- controll variables show expected signs

5. Conclusion

5.1 EMU + US

empirical analysis of relationship between public debt and subsequent economic growth shows for **EMU+US**:

- some evidence for **negative** correlation
- results supported by different specifications (time intervals, regression model, included variables)
- only weak evidence for non-linearities

5. Conclusion

5.2 Emerging markets

empirical analysis of relationship between public debt and subsequent economic growth shows for **EM**:

- some evidence for **positive** correlation between public debt and economic growth in EM
- results supported by different specifications (time intervals, regression model, included variables)

5. Conclusion
5.3 CEECs

empirical analysis of relationship between public debt and subsequent economic growth shows for **CEECs**:

- empirical evidence for **negative** correlation between public deficit and economic growth in new member states
- results with separated response before and after accession: only significant negative effect **after accession**

5. Conclusion

further research:

- more robustness checks,
- considering heterogeneity,
- extension of panel:

  For instance: results suppored by Romania & Bulgaria 2007?

Comments are welcome

Thank you!

Contact:
bboekemeier@wiwi.uni-bielefeld.de