Measuring Bank Insolvency Risk in CEEC

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Outline

1. Motivation
2. Empirics
   - 2.1 Bank insolvency risk decomposition (regression analysis)
   - 2.2 Conditional indicators of insolvency
   - 2.3 Case study: Croatia
3. Conclusion

Motivation

1. Exploring the factors that affect bank stability in CEEC
2. Construction of an indicator that would link bank insolvency risk with bank-specific and macroeconomic indicators

Empirics

z-score - insolvency risk measure

Assume that bank returns (R) follow an arbitrary distribution with first two moments - μ_R and σ_R

Definition: $Z = \frac{\mu_R + K}{\sigma_R}$

Distance to insolvency: $P\{R \leq -K\} = P\{R \leq \mu_R - z\sigma_R\}$

Probability of insolvency: $P\{R \leq -K\} \leq \frac{1}{Z^2}$

Empirics

Country Regressions (Bulgaria, Croatia, Czech Republic, Hungary, Latvia, Lithuania and Slovakia)

$$\ln(z_{it}) = \alpha + \beta_0 \ln(z_{it-1}) + \sum_{j=1}^{J} \beta_j X_{jt} + \sum_{k=1}^{K} \gamma_k Y_{ikt} + \varepsilon_{it},$$

Bank-specific variables (Y) credit growth, liquidity, loan portfolio quality, asset structure, size

Macroeconomic variables (X) real output growth, inflation, interest rate

Banking sector variable market concentration

Empirics

Regression results

1. Considerable heterogeneity among countries
2. In general, bank insolvency risk increases in:
   - credit growth
   - banking sector concentration
   - inflation
3. *Moving window* regression results suggest that estimated relations were not stable over time

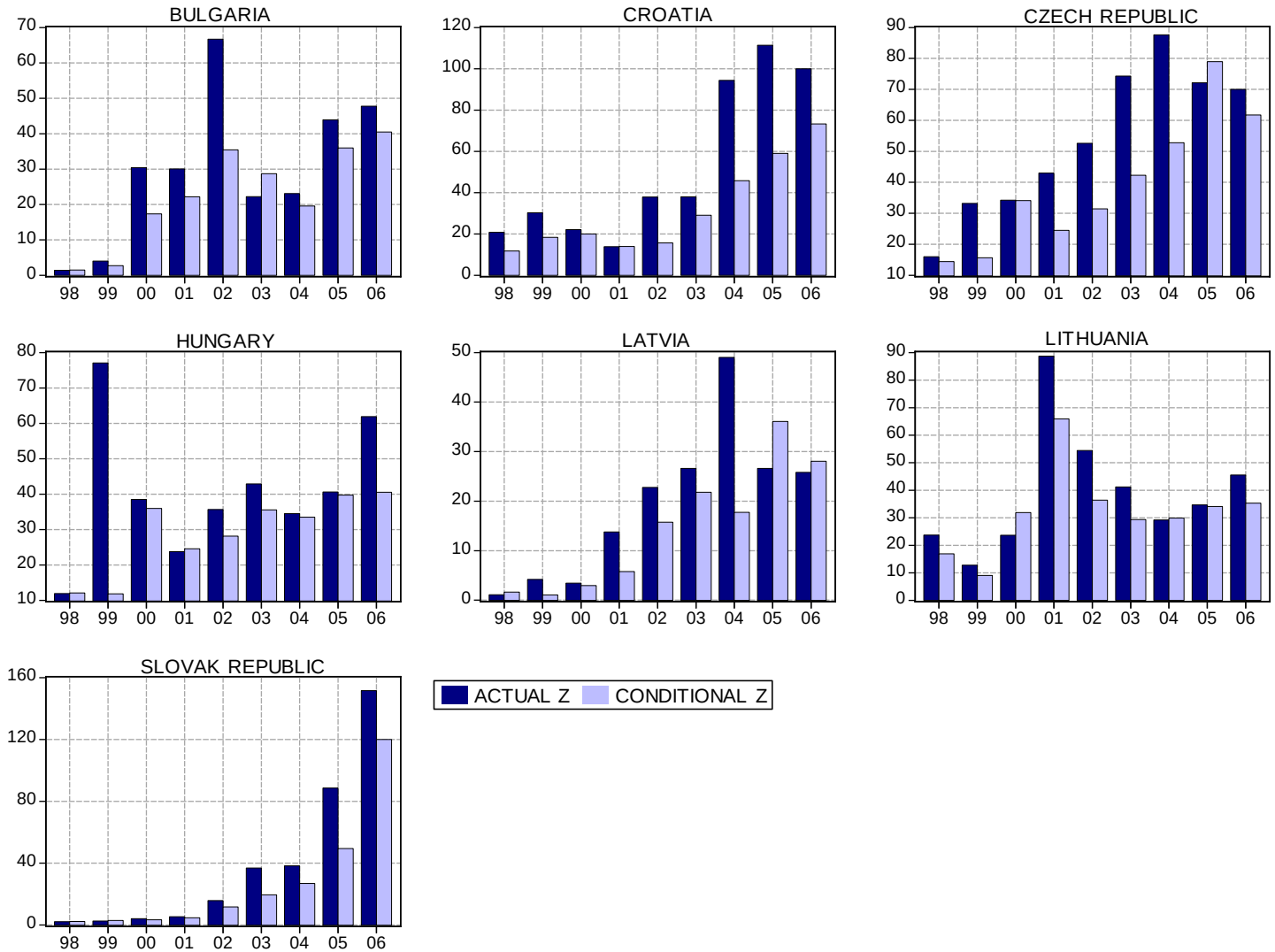
Empirics

Systemic insolvency indicators

- Individual *z-scores* are aggregated in systemic indicators, defined as weighted average of individual banks *z-scores*
- Two different measures of bank stability for each country:
  1. Actual z-score based on accounting data
  2. Conditional *z-scores* $\rightsquigarrow$ fitted values from regressions
- Conditional indicators *directly link* insolvency risk with macroeconomic environment and bank-specific variables

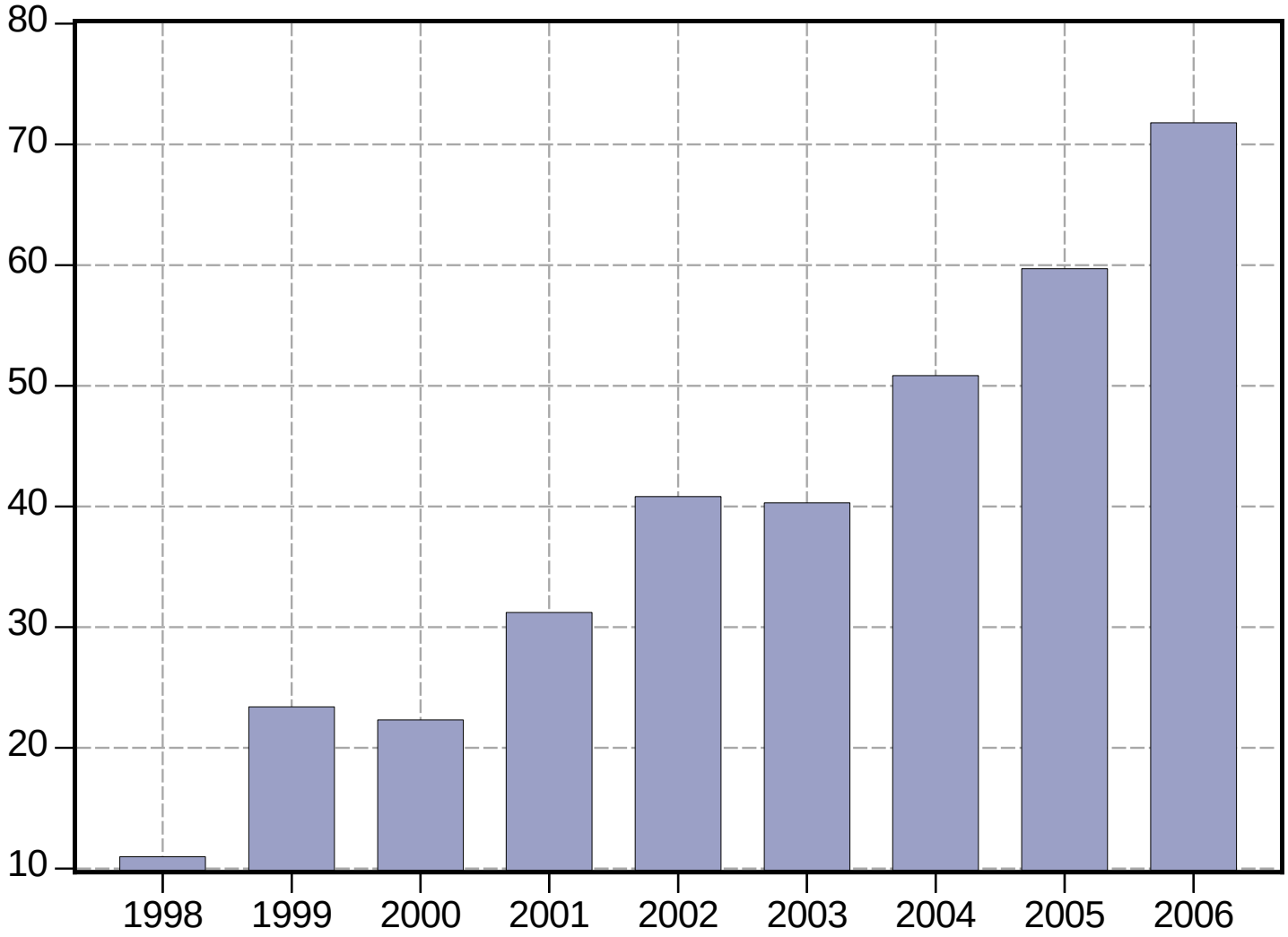
Empirics

Insolvency indicators in CEEC



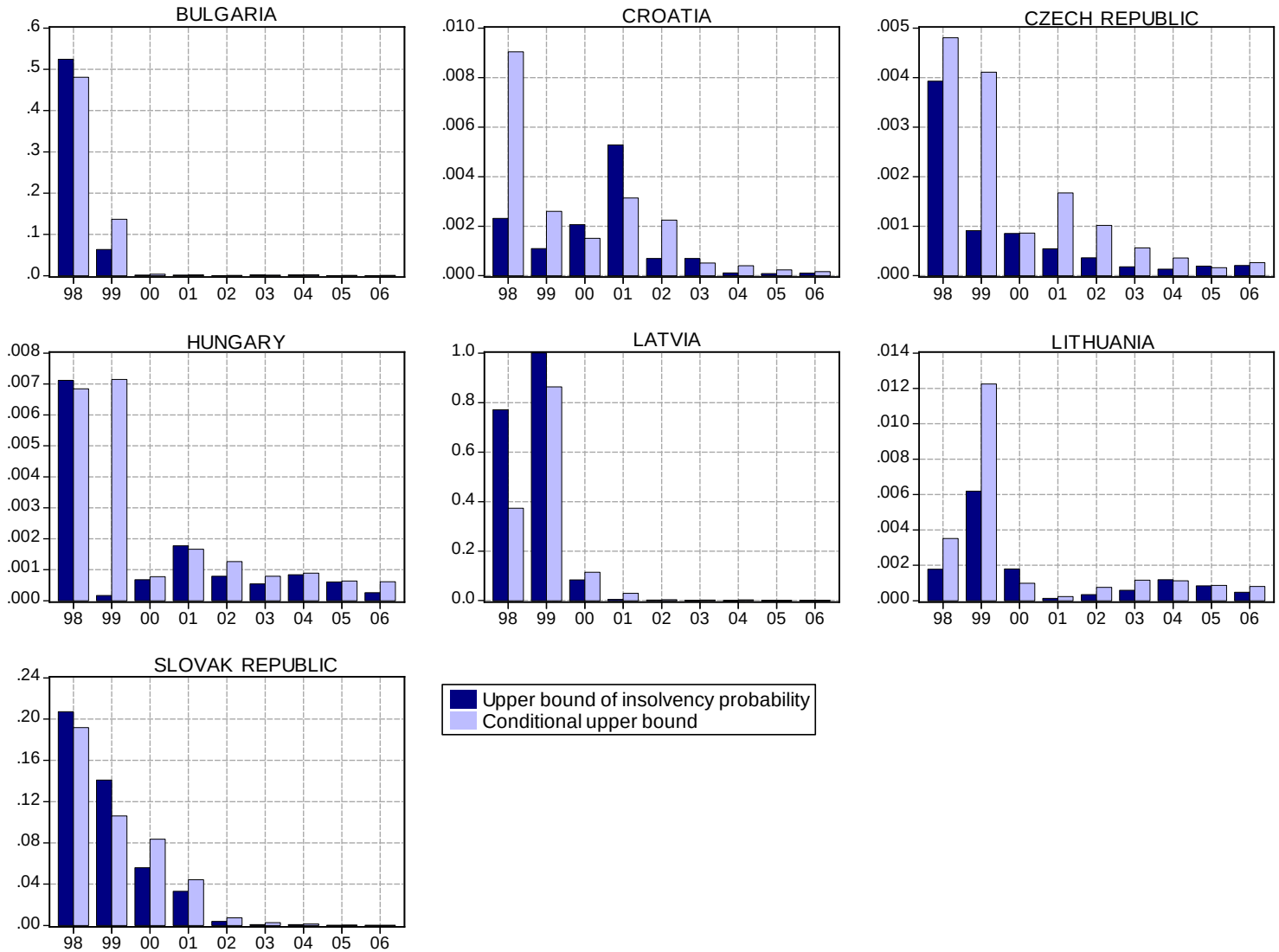
Empirics

Average z-score in CEEC



Empirics

Insolvency probabilities



Case study: Croatia

- What is different?

1. Country-specific regression: new explanatory variables
2. Alternative z-score, based on annualised data from banks' quarterly reports
3. More detailed and more reliable data from central bank's monetary statistics

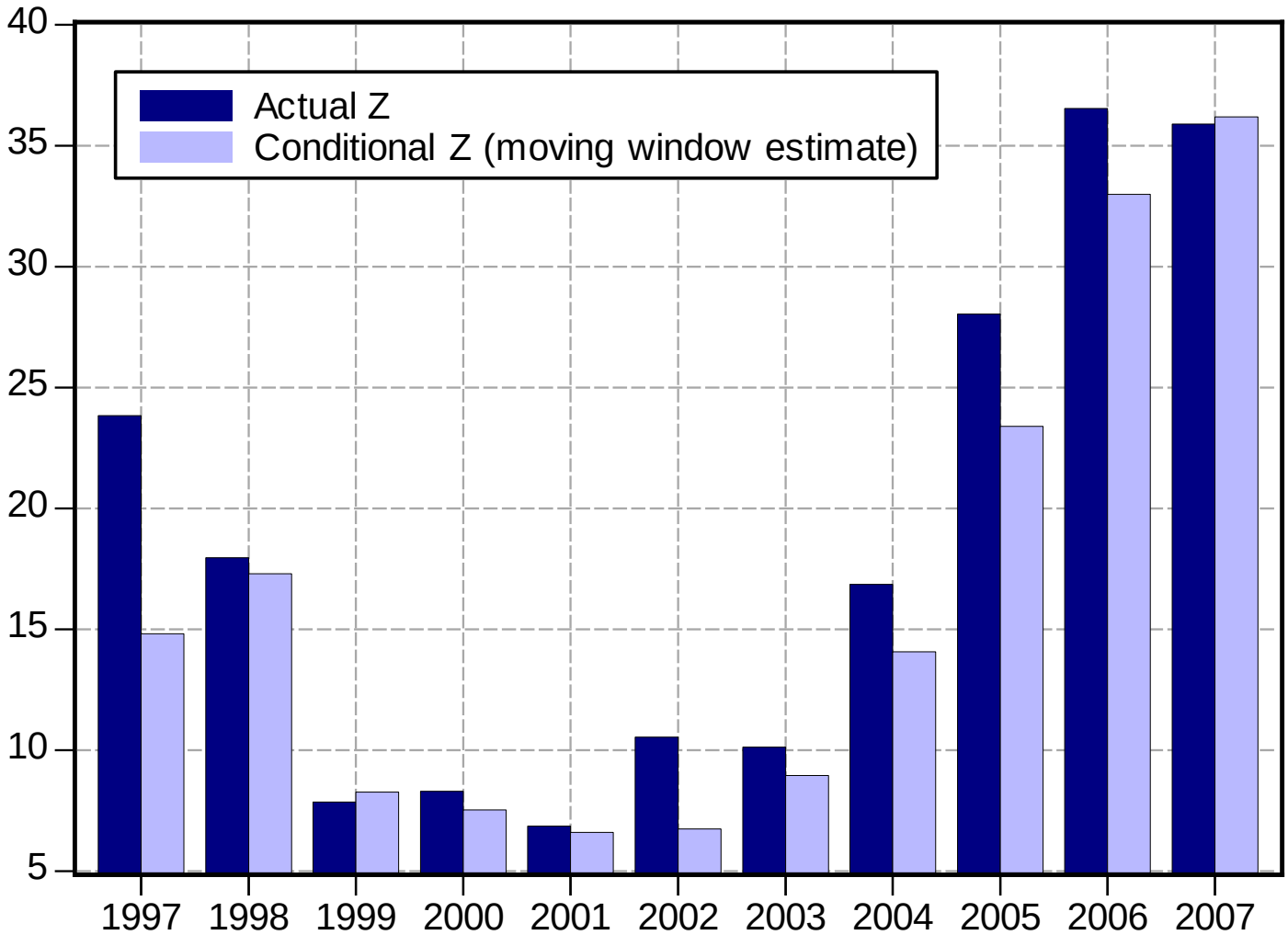
Case study: Croatia

Regression estimates, moving window (5 years) and total sample specifications

		Bank specific variables					Dummies		Macro variables				
	z(-1)	**Credit growth**	**NPL**	**Foreign financing**	**Loans/ assets**	**Total assets**	**Corp_d**	**Domestic bank**	**GDP**	**CPI**	**HRK/EUR**	**HHI**	**R^2**
1996-2000	0.77(**)	-0.04(*)	-2.64(*)	0.39	-2.12(**)	-0.11	0.32(**)	0.21(*)	-1.5(*)	0.68(**)	2.34(**)	0.9(**)	0.68
1997-2001	0.76(**)	-0.04(*)	-2.26(*)	0.50	-1.1(*)	-0.06	0.27(**)	0.21(*)	-47.84(**)	0.59(**)	-73.13(**)	19.02(**)	0.69
1998-2002	0.67(**)	-0.18(**)	-2.75(**)	0.13	-0.26	0.00	0.04	0.31(**)	22.02(**)	0.36(**)	28.57(**)	-5.84(**)	0.64
1999-2003	0.58(**)	0.07	-1.68(*)	-0.43	0.02	0.05	-0.03	0.4(**)	5.60(**)	-0.47(**)	17.86(**)	2.41(**)	0.52
2000-2004	0.55(**)	0.09	-1.52(*)	-1.17(**)	0.97(*)	0.15(**)	-0.01	0.27(**)	44.45(**)	-1.20(**)	32.8(**)	17.61(**)	0.58
2001-2005	0.63(**)	-0.04	-0.61(*)	-0.69(*)	1.66(**)	0.17(**)	-0.05	0.15	36.67(**)	-0.11(**)	-4.43(**)	9.98(**)	0.69
2002-2006	0.63(**)	-0.49(**)	-0.41	-0.89(**)	1.29(**)	0.15(*)	-0.19(*)	0.01	-38.94(**)	-0.07(**)	-1.29(*)	-1.38	0.66
2003-2007	0.61(**)	-0.53(**)	0.07	-0.74(**)	1.37(*)	0.13(*)	-0.15(*)	-0.08	-12.59(**)	-0.14(**)	-4.51(**)	2.44(**)	0.67
1996-2007	**0.70(**)**	**-0.32(**)**	**-1.41(**)**	**-0.07**	**0.43**	**0.03**	**-0.10(*)**	**0.04**	**1.86(*)**	**0.19(**)**	**-6.74(**)**	**1.90(**)**	**0.68**

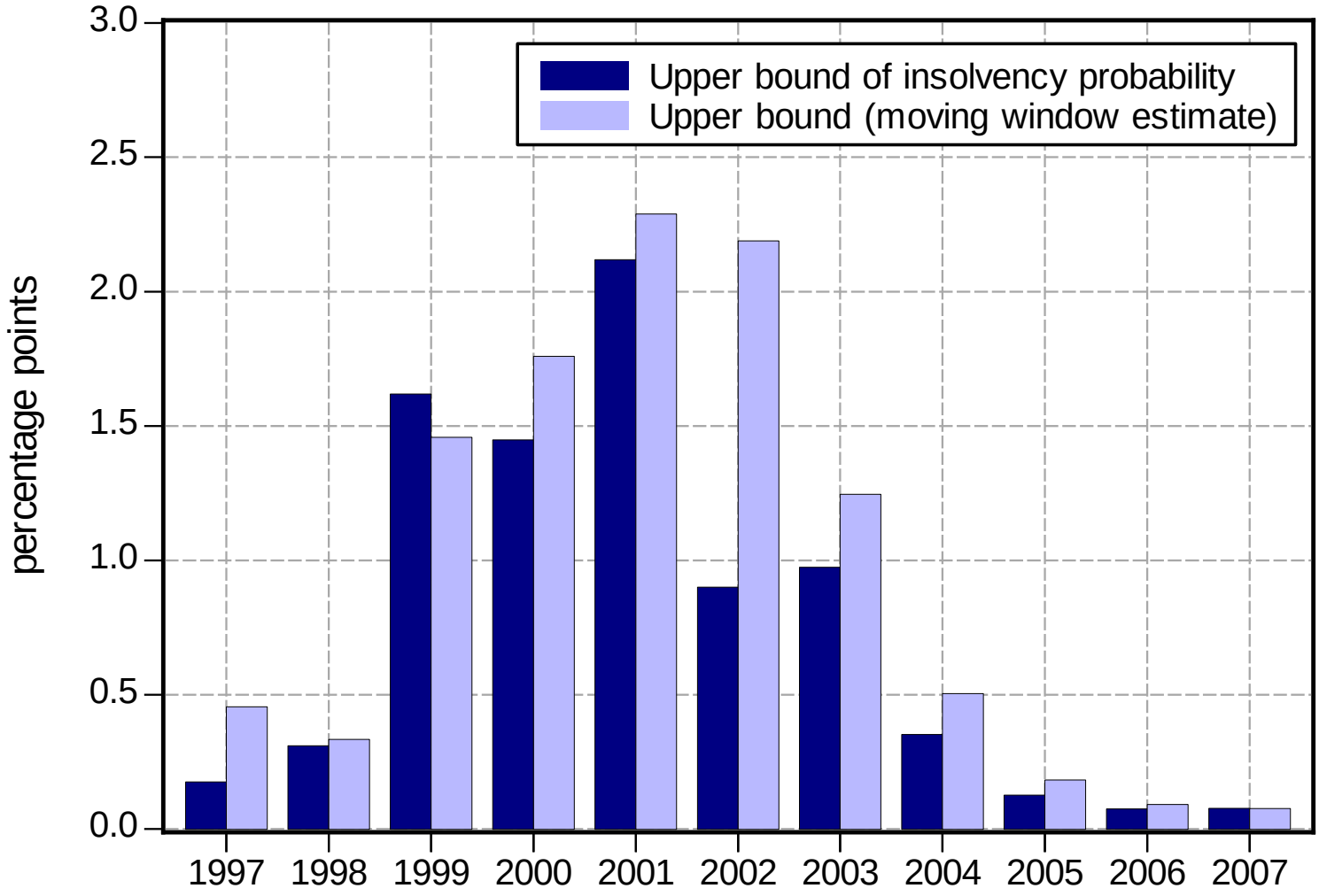
Case study: Croatia

Insolvency indicators



Case study: Croatia

Insolvency probabilities



Conclusion

1. Bank stability in CEEC substantially increased during the last ten years
2. Estimated systemic probabilities of insolvency in the last three years did not exceed 0.1% in any country
3. Regression results suggest that bank insolvency risk increases in:
   - credit growth
   - inflation
   - banking sector concentration