The transition into financial crisis:

Fundamentals, path dependence or institutions?

Arnab Bhattacharjee and Rosen Azad Chowdhury

University of Dundee, Scotland, UK

E-mail: a.z.bhattacharjee@dundee.ac.uk

Financial Crisis – Models and Policy Responses

Theory and past evidence

Models of currency crises

First Generation Models (e.g., Krugman, 1979)

Inconsistent government policies and persistent government spending

↓

Government increases domestic money supply to monetise the deficit

↓

Inflation increases, harder to maintain the peg or fixed exchange rate

↓

End result: the regime must collapse and crisis is inevitable

Limitations

- Explains the Bretton Woods crisis of the seventies but not later crises like the Mexican Peso crisis.
- Government acts in a mechanical way and is undermined in the models; only increasing domestic money supply and losing reserves.
- Countries that suffer a collapse often appear to have plenty of reserves left to purchase all of the outstanding monetary base. For example, in the ERM crisis UK foreign reserves where 116 percent of the monetary base.

Second generation models

(e.g., Obstfeld, 1996)

- Government minimises the cost of maintaining the peg – multiple equilibria
  - Government benefits from depreciation, perhaps to reduce unemployment or reduce real value of debt. Cost of maintaining the peg is directly related to depreciation.
  - Governments face reputational loss if they abandon the peg

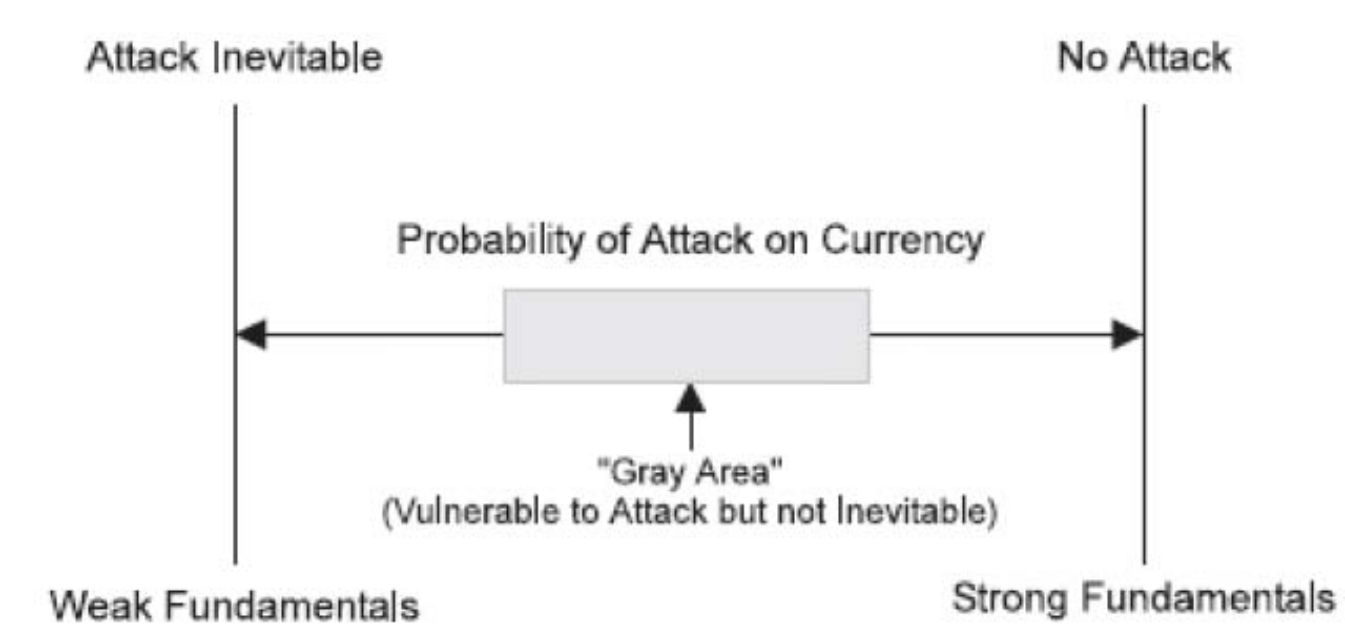


Fig: Second Generation crisis model

Second generation models – contd.
(e.g., Obstfeld, 1996)

• The probability of a successful attack happening in the grey zone depends **on** strength of the fundamentals.
• If the banking industry is strong (or unemployment is low) the government can keep the interest rate high, maintain capital inflows and prevent collapse.

Limitations:

• Second generation models explain the ERM crisis well where fundamentals were suspect but not certain to cause a crisis. However, they don't explain the Asian crisis where fundamentals were not suspect.
• Both first and second generation models does not explicitly show how loss of investor confidence affect the economy – flight of money following a devaluation.
• No banking sector.

Third generation models

(Mackinnon and Phill, 1997; Aghion and Banerjee, 2004)

Banks borrow cheap money from abroad
(Asymmetric information exists in the market)

↓

Economy does well

↓ (If there is a large depreciation of the currency)

Domestic bank liabilities > Assets (currency mismatch)

↓

Loss in bank equity

↓

Investors start withdrawing funds and stop lending

↓

Negative impact on investor confidence > positive impact of depreciation

↓

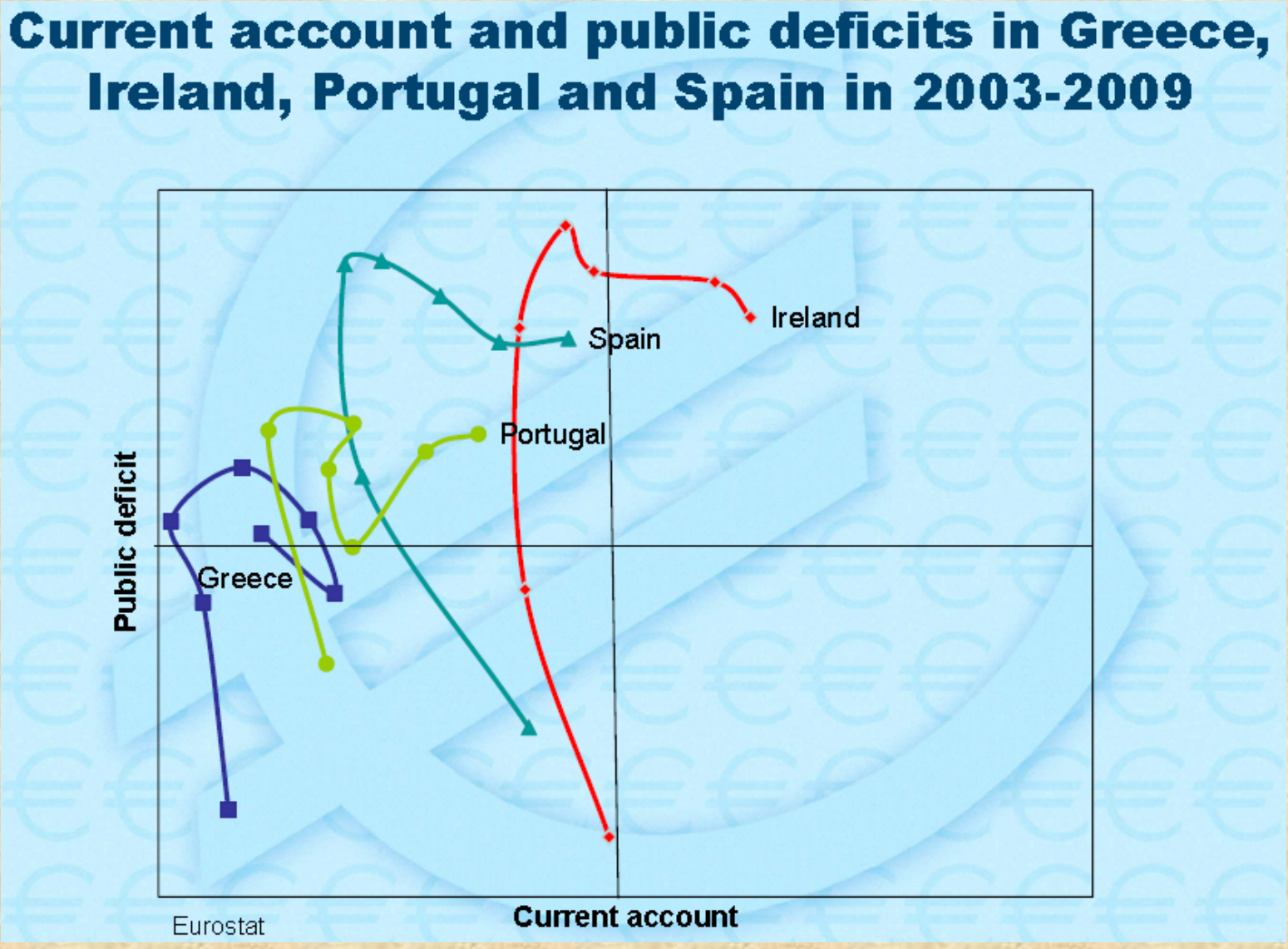
Fall in output and crisis starts

Fundamentals

Name	CDS spread	Current Account Avg over 5 years	Public Debt % GDP (Est 2010)	Budget balance (Est 2010)
USA	36	-4,9%	67%	-9,5%
UK	79	-2,5%	84%	-11,6%
Germany	33	5,6%	81%	-7,9%
France	41	-1,1%	86%	-5,4%
Italy	99	-2,5%	119%	-5,2%
Spain	102	-8,4%	61%	-10,2%
Portugal	117	-10,2%	81%	-7,3%
Ireland	120	-3,9%	76%	-13,3%
Greece	298	-11,4%	108%	-12,7%
Japan	61	3,5%	115%	-10,0%
Switzerland	45	9,3%	44%	-1,5%
Autralia	40	-5,0%	19%	-5,3%
Norway	16	16,6%	60%	11,8%
Sweden	38	7,7%	48%	-3,9%

Path dependence

(e.g., Honkapohja and Pankki, 2012)



Transition into Financial Crisis

(Reinhart, Rogoff, and co-authors, 2009-2012)

- Extensive data set of high and middle-to-low income countries
- Systemic banking crises typically preceded by credit booms and asset price bubbles
- During crisis, output falls, and central government debt rises sharply
- The “this time is different” syndrome
- Banking and currency crises closely related
- Correlated with, and leading to, debt crisis
  – evidence on causation weak (lack of data)
- Historical analysis point to importance of institutions

Debt, Budget Balance and Institutions?

(Neild, 2012)

The Relationship of Changes in the National Debt to Changes in GDP, 1816 to 2010

Year	*Debt:GDP %*	*Gross Debt £'000m*	*GDP £'000m*	*Unemployment %*
1816	260	0.78	0.30	..
1914	24	0.62	2.55	3
1919	127	7.41	5.83	3
1923	176	7.73	4.39	12
1929	158	7.49	4.73	10
1933	179	7.63	4.26	20
1939	137	8.15	5.96	11
1945	225	21.4	9.5	1
1970	67	33.1	49.4	3
1980	43	95.3	222	7
1990	35	193	551	7
2000	45	426	943	5
2010	75 **[53]***	1,071 **[760**	1,437	8

Table 2: Budget Indicators and a Corruption Index for Selected European Countries, 2010

Country	*Govt debt as per cent of GDP.*	*Budget balance*	*Govt. revenue*	*Corruption Index rank order*
Denmark	44	-2.6	56	1=
Sweden	40	0.2	53	2=
Germany	83	-4.3	44	15=
UK	80	-10.3	40	20
France	82	-7.1	50	25
Spain	61	-9.3	36	30=
Portugal	93	-9.8	42	32
Italy	118	-4.6	46	67
Greece	145	-10.6	40	78=
EU Average	**80**	**- 6.6**	**44**	

Regulatory failures?

(Honkapohja and Pankki, 2012, etc.)

- Greece – IMF, Article IV report, Dec 2006
  - *"Significant fiscal consolidation was put in place in 2005-06, but further deficit cuts are needed"*
  - *"Vulnerabilities have developed in the form of a very high credit growth, persistent inflationary pressures, eroding competitiveness, and an unsustainably large current account deficit"*
- Greece – OECD, country report, May 2007
  - *"There has been substantial [fiscal] consolidation since 2004"*
  - *"Losses in competitiveness may ultimately undermine growth performance"*
  - *"The clearest sign of macroeconomic tension is an increase in the current account deficit"*
- Overall assessment in 2006-07
  - Fiscal situation improving
  - External deficit seen as vulnerability
  - No alarm bells!

Regulatory failures?

(Contd.)

- Ireland – IMF, Article IV report, June 2006
  - *"Economic policies have been in line with Fund policy advice."*
  - *"Financial system continues to perform well, but rapid credit growth is a vulnerability"*
  - *"concentration of lending in property-related sectors … banks' reliance on wholesale funding"*
  - *"Regulatory and supervisory framework has been strengthened in line with the recommendations of the 2000 FSAP."*
- Ireland – OECD, Economic survey, March 2006
  - *"The fiscal position is healthy"*
  - *"House prices may have overshot fundamentals to some extent, although this does not imply that they will fall significantly."*
- Overall assessment in 2006
  - Growth performance strong and sustainable, strong public finances
  - Well-supervised financial sector, but housing sector risks
  - No alarm bells!
- **Regulatory failures? Are crises really predictable?**

What this paper does

Transition into Financial Crisis

Fundamentals, Path dependence or Institutions?

- Reinhart-Rogoff data on financial crises
- We focus on *duration to* a banking and currency crises
  - Annual data from 1970 to 2010
  - 227 spells – 191 completed spells, 36 censored
  - 44 countries
  - Full data for 122 completed spells
- Predict when a country enters financial crisis
- Fundamentals
  - Current account, external debt, inflation, growth and prices
  - Global economy: interest rates, oil prices
- Path dependence
  - Assume country returns to initial state after recovery
    - Perfect repair – may not be reasonable
  - Effect of fundamentals vary with duration
    - Non-proportional hazards
- Institutions
  - Country fixed or random effects
  - Suggests strength of institutions – corruption, central bank independence, exchange rate regimes, etc.
- Estimate model with data up to 2001, predict 2002-2008

Discrete duration model

- Hazard rate: $\lambda\left(t \mid X(t), u\right) = \lim_{\Delta t \downarrow 0} \frac{1}{\Delta t} P\left[t \leq T < t + \Delta t \mid T \geq t, X(t), u\right]$
- Mixed non-proportional hazards (MNPH) model:

$$\lambda\left(t \mid X(t), u\right) = \lambda_0\left(t\right).\exp\left[X(t)'\beta(t)\right].u; \qquad U \sim F(u)$$

  - Model has three components
  - Baseline hazard rate, $\lambda_0(t)$
  - (Non-proportional) covariate effects, $\beta(t)$
    - different effects at different durations
  - Unobserved heterogeneity, u
- Complementary log-log model:
  - Discrete duration data – aggregation over intervals
- Heckman-Singer model
  - Complementary log-log MNPH model
  - Unknown heterogeneity distribution *F(.)*
  - Approximated by discrete multinomial mixture with increasing number of mass points
- Estimated using Stata

Results

Fundamentals

➢ Growth rate (above long term trend):	Negative	(***)
➢ External debt:	Positive	(**)
➢ Budget surplus:	Negative	(**)
➢ OECD dummy:	Negative	(**)
➢ Current a/c surplus:	Negative	(*)
➢ (Global) interest rate – easy money:	Negative	(*)
➢ Inflation rate:	Positive	(*)

(***), (**), (*): Statistically significant at 1%, 5%, and 10% levels respectively

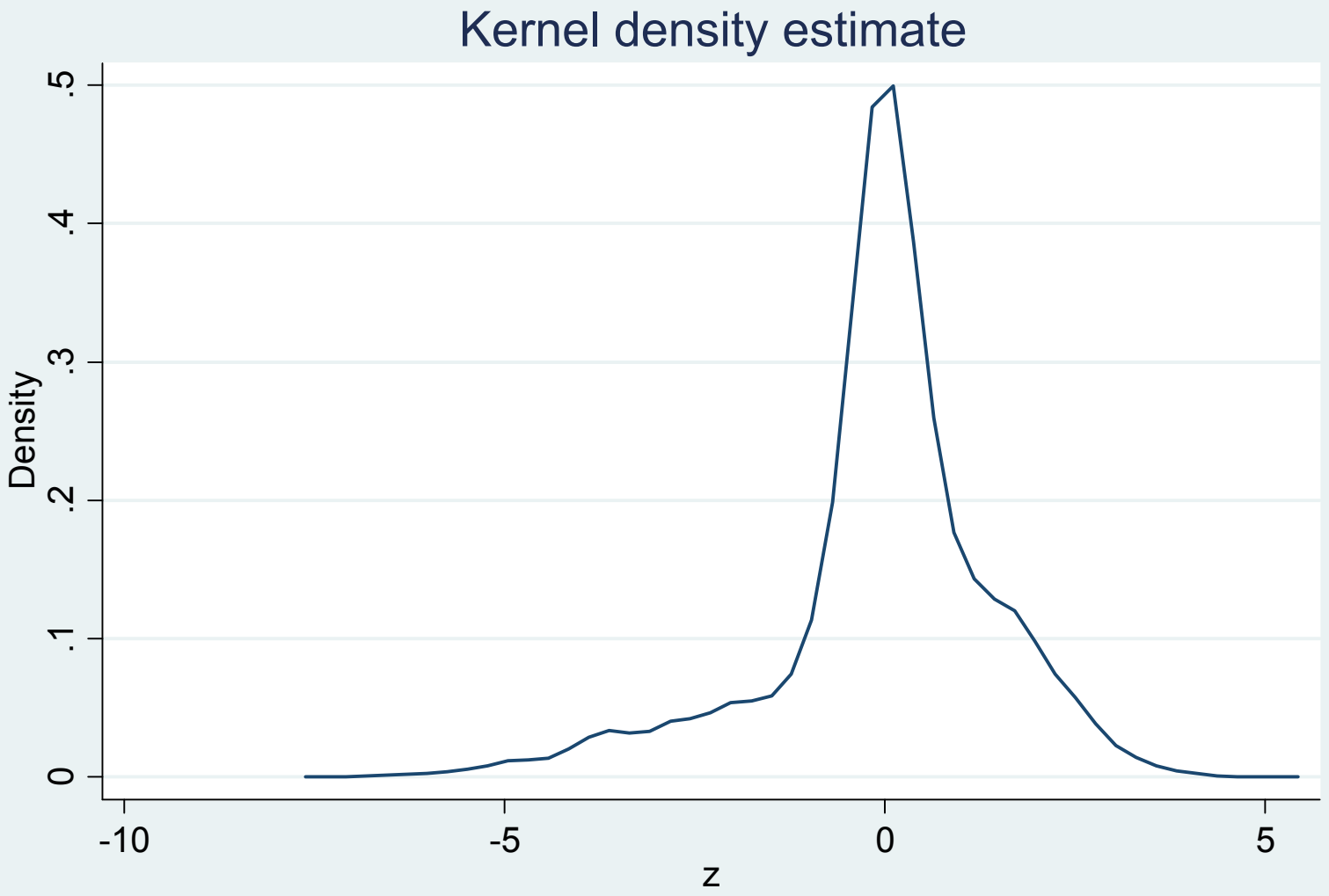
Path dependence

- Baseline hazard decreases with spell length/ duration
- Better fit with minimal repair
  - perfect repair: return to initial state after recovery
  - minimal repair: return to state just before crisis
  - reality: somewhere in between?
- Non-proportional effect of fundamentals
  - Effect increasing with duration: Growth rate, Current a/c
    - contemporaneous effects are more prominent
  - Effect decreasing with duration: External debt, budget balance, global interest rate
    - past fundamentals are more important

Institutions

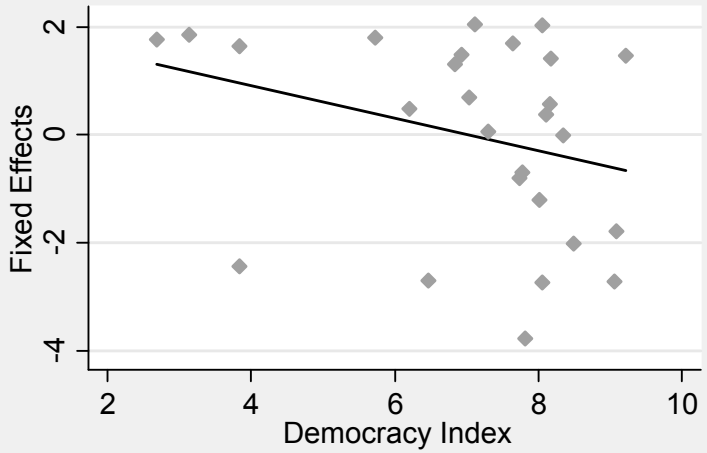
- Strong significance of country fixed and random effects
  - Large FEs: China, Korea, Zimbabwe, Greece
  - Small FEs: Finland, Belgium, Austria, Canada
  - Medium FEs: UK, USA, Germany, France
- Cross-country regression of FEs on institutional factors
  - Fixed exchange rate: Positive (**)
  - Failed state: Positive (**)
  - Corruption index (less corruption, high value): Negative (**)
  - Central bank independence: Negative (*)

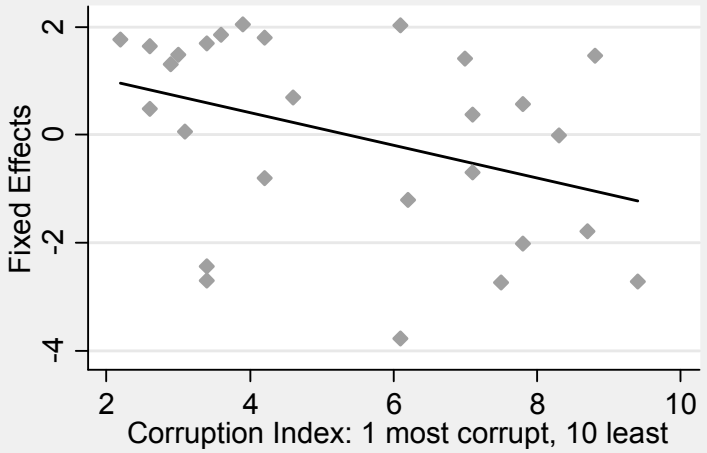
Heterogeneity distribution

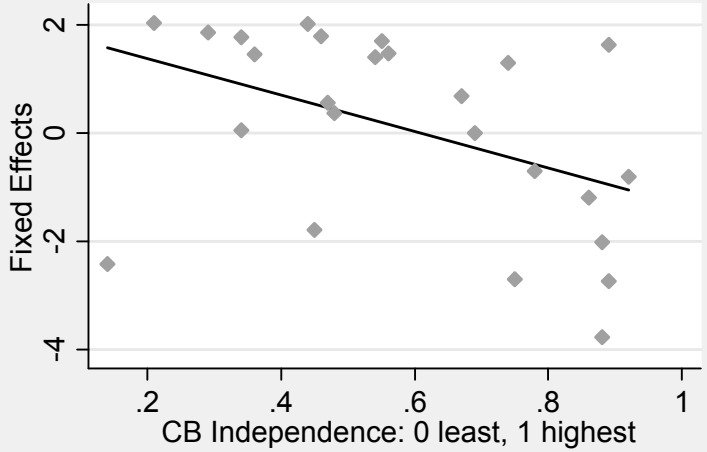


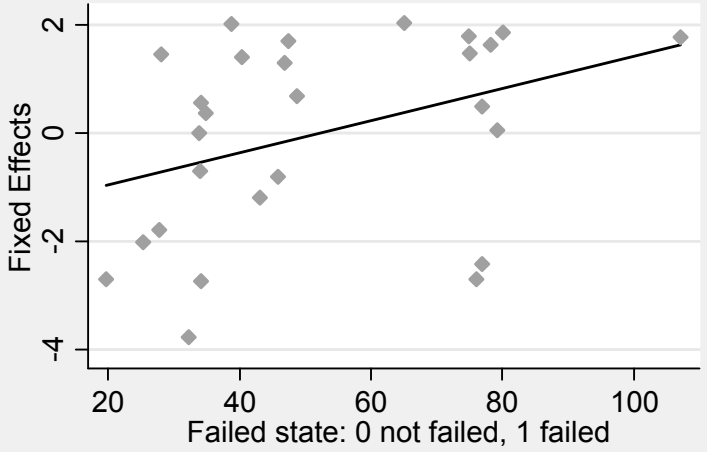
Institutional factors

Unobserved Fixed Country Effects against Institutional Factors



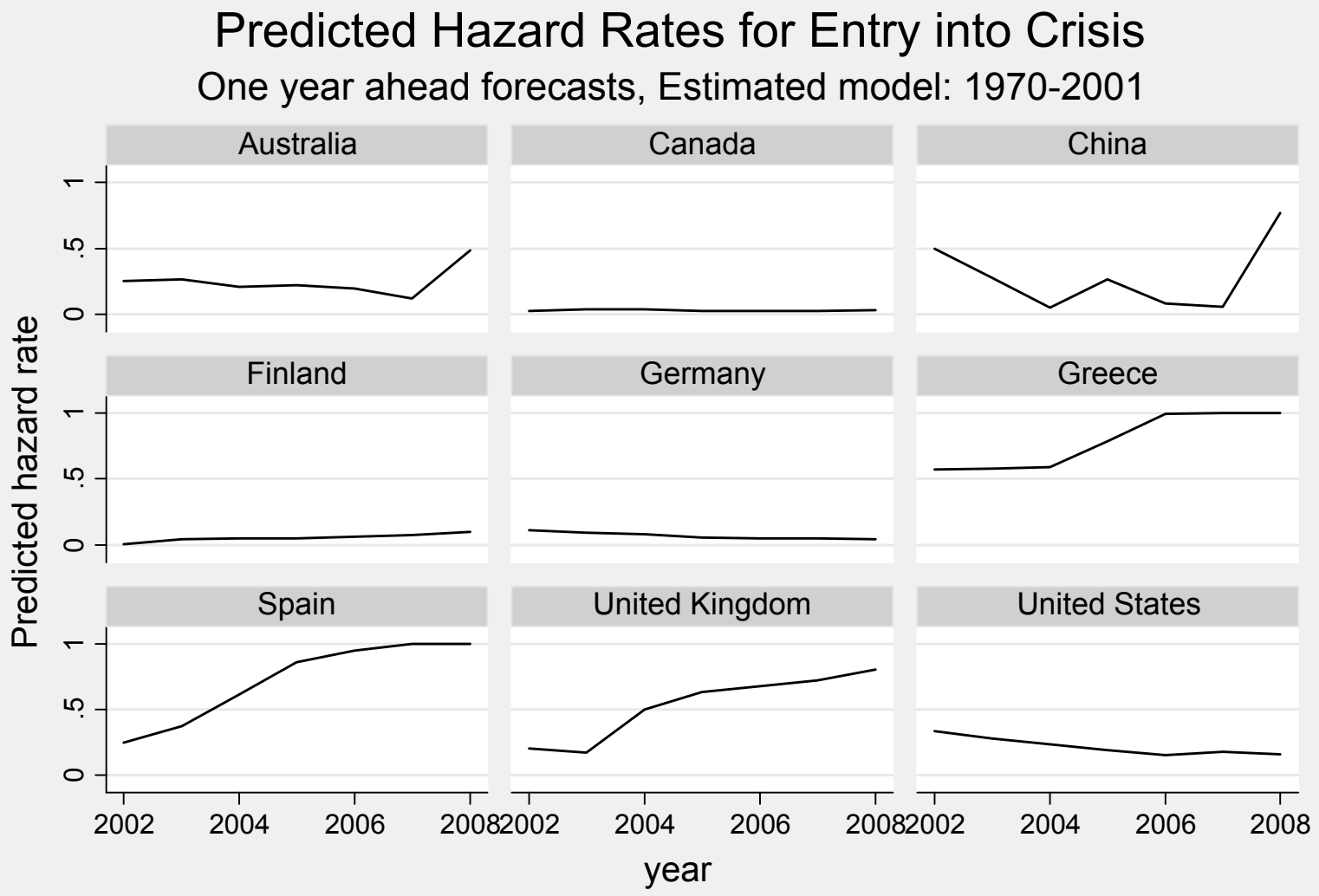






Predictions

MNPH models (estimation sample up to 2001)



Conclusion

Conclusion

- Investigate separately role of fundamentals, path dependence and institutions on …
- … the hazard rate of transition into financial crisis
- Fundamentals are important – expected signs
  - Negative effect: growth rate, budget surplus, current a/c surplus
  - Positive effect: external debt, inflation
  - Easy money (low global interest rate) increases hazard
- Path dependence
  - Effect of growth rate and current account increases with duration
  - Past levels of external debt, budget surplus and interest rate more important
- Institutional factors are extremely important
  - Country fixed and random effects highly significant
  - Explained by corruption, exchange rate regime, central bank independence, democracy, etc.
- Predictions are useful
  - Only after unobserved heterogeneity/institutions are accounted for
- Extensions
  - data before 1970, type of recovery, competing risks heterogeneity?

Thank you very much!!!