Fiscal and Financial Crises

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March 21 2016

Introduction

- The recent Eurozone crisis involved both sovereign debt and the banking system.

- Debt crises combined with banking crises are not new.

- In the Eurozone crisis, a threatened Greek default fed into a banking crisis because EZ banks held large amounts of sovereign debt.

- A guarantee of the Irish banks in 2008 led to a debt crisis which fed back into the banks.

Introduction

- The Asian Crisis of 1997-98 via a guarantee of banks led to a triple crisis; debt, banking and currency

- Triple crises also occurred in the 1890s

- The paper examines the interconnections between financial and fiscal crises based on history, theory, and empirics.

Historical Overview

- Financial Crises can be traced back 100s of years (Kindleberger 1987)

- The nature and origins of fiscal crises and their relationship to banking crises has changed over the long-run.

- Banking crises before deposit insurance were banking panics.

- Panics would propagate through asset markets via fire sales.

- Banking crises can occur as a consequence of bank <u>credit driven</u> asset price booms.

- Banking panics could be caused by shocks to shadow banks.

Historical Overview

- Banking Crises have often spread to many countries.

- Interest rate shocks in the financial center was often the trigger.

- Advanced countries had many panics in the nineteenth century before central banks learned to be LLRs.

- With the advent of deposit insurance and other forms of guarantees, banking panics became banking crises which were resolved by a fiscal rescue.

Historical Overview

- This created a direct link between the banking system and the government's balance sheet.

- Costly bailouts could lead to fiscal imbalances and, possibly, defaults.

- Guarantees could create moral hazard which could lead to higher bailout costs and risk of fiscal crisis.

Historical Overview

- Before the 1930s sovereign defaults had been frequent, especially in emerging countries.

- They reflected capital flow bonanzas (Reinhart and Rogoff 2009) and sudden stops.

- Many emerging countries were serial defaulters (Reinhart, Rogoff, Savastano 2003).

Historical Overview

- Currency Crises were a frequent occurrence of emerging countries throughout the nineteenth and twentieth centuries.

- Advanced countries faced them during the 1930s and under Bretton Woods.

- Twin banking and currency crises have also occurred since the nineteenth century (Kaminsky and Reinhart 1989).

- Causality was often two ways. A key conduit was foreign currency denominated debt (original sin).

Historical Overview

- Original sin (foreign currency denominated debt) linked banking, currency and debt crises together in the 1890s (Bordo and Flandreau 2003).

- Original sin combined with government guarantees linked the three types of crises together in the 1990s crises.

- The recent Eurozone Crisis was the culmination of a long history of different types of crises and their growing interconnections.

- The interconnections reflected financial globalization and a belief in the necessity for government to socialize the income losses of financial crises.

3. Financial and Fiscal Crises: Theory

- <u>Banking Crises</u>

- The traditional view of a banking crisis was a banking panic or liquidity crisis.

- It occurred in a contagious banking when the public fearful that their banks will not be able to convert their deposits into currency attempts en mass to do so.

Banking Crises

- Unless allayed by a LLR the real economy will be impacted by a decline in money supply, impairment of the payment system and interruption of bank lending.

- Post WWII with development of a safety net banking panics have become rare.

- Instead banking crises involve the insolvency of the banking system.

- Unlike panics which are brief episodes resolved by the central bank.

- A banking crisis is a prolonged disturbance that is resolved by the fiscal authorities.

Banking Crises : Traditional approaches

- Monetarist approach
  - Friedman and Schwartz(1963) banking panics are important because of their effects on money supply and hence real income

  - Banking panics occur because of a loss of confidence in the banks in their ability to convert deposits into currency
  - Often occurred with the failure of an important financial institution

- A banking panic, if not prevented by the MA, will lead to massive banking failures of otherwise sound banks forced into insolvency by a fall in the value of their assets

- Banking Panics 1930-33 reduced M by the M multiplier and reduced real income

Banking Crises: Traditional Approach

- Debate over whether banking crises of the 1930s were really liquidity panics or reflected bank insolvency as endogenous response to recession.

Banking Crises: Financial Fragility Approach

- Minsky, Kindleberger, Fisher (1933) saw financial crises as a necessary consequence of the excesses of previous boom.

- According to Fisher an exogenous displacement initiates the upswing in the cycle

- This leads to credit financed investment boom

- The process continues until a state of over indebtedness is reached

- A crisis can be triggered by errors in judgement—a Minsky moment

- Distressed selling leads to declines in asset prices and the price level

Banking Crises: Financial Fragility

- Falling prices lead to debt deflation…

- In the Crisis of 2007-2008 the Lehman failure viewed as a Minsky moment.

- BIS view follows this approach – key role for the credit cycle in generating credit driven asset price boom busts and financial crises.

Banking Crises: Business Cycle Approach

- Depositors anticipating an increase in non performing loans during a recession will try to protect their wealth by withdrawing their deposits precipitating a bank run(Mitchell 1941, Allen and Gale 2007).

- Gorton (1988): depositors anticipating a decline in income in an attempt to smooth consumption remove funds from banks before the business cycle peak.

Banking Crises: Recent approaches

- **<u>Diamond and Dybvig (1983)</u>**
  - banks intermediate between demand deposits and long term investments
  - Possibility of maturity mismatch
  - A run can be triggered by a sunspot because rational depositors , not wishing to be last in line rush to convert deposits into currency

- A panic can be prevented by DI or LLR

Banking Crises: Recent Approaches

- Extensive literature based on DD (1983)

- DD (1983) extended to include financial markets (Allen and Gale 1998); bubbles, monetary policy (Diamond and Rajan 2001...), interbank markets (Bhattacharya and gale(1987); LLR (Holmstrom and Tirole (1998)

Banking Crises: Information Asymmetry

- Depositors can not costlessly value individual bank assets and hence have difficulty monitoring bank performance (Jacklin and Bhattacharya 1988)

- A panic is a form of monitoring

- Faced with new information which raises the perceived riskiness of bank assets, depositors force out both sound and unsound banks by a system wide panic

Fiscal Crises

- ## Debt Crises

    - A debt crisis arises when fiscal authorities are unable to raise sufficient tax revenue in the present and the future to service and amortize debt

    - A debt crisis can become a banking crisis when it impinges on the banking system and a currency crises when it threatens CB reserves

Fiscal Crises

- Banking crises can feed into debt crises when the fiscal authorities bail out insolvent banks which then increases sovereign debt until it becomes unsustainable.

- Debt Crises can spill into banking crises when banks hold sovereign debt

Debt Crises: Theory

- Eaton and Gersovitz (1981) . Fear of loss of access to credit markets prevents debtors from defaulting

- Bulow and Rogoff (1989) . Fear of sanctions explains why countries avoid default

- Debate over sanctions(Cole and Kehoe, Eaton 1996, Kletzer and Wright 2000)

- Serial default (Reinhart, Rogoff and Savastano (2003) persistence in defaults

- Countries which were serial defaulters had debt intolerance

- Reinhart and Rogoff (2009) distinction between domestic debt and foreign debt

Fiscal Crises and Financial Crises

- A key integrating element between financial and fiscal crises in the post WWII era was the widespread use by the government of guarantees of the liabilities of the banking system.

- Seminal article by Diaz Alejandro (1985).

- Describes Chilean liberalization of domestic financial system and capital account in late 1970s.

- This led to heavy capital inflows which led to increases in bank credit and created an asset price boom.

Fiscal Crises and Financial Crises

- A major Chilean bank failure in 1977 led to a government bail out.

- This encouraged moral hazard

- In 1982 more banks failed and their liabilities guaranteed

- This meant that the government had taken on a new contingent claim which led to a growing fiscal deficit

- The CB financed the deficit by printing money this led to a speculative attack on the CBs reserves

- A major banking and currency crisis ensued in summer 1982 followed by a debt crisis in 1983.

- McKinnon and Pill (1986) tell a similar story

Fiscal Crises and Financial Crises

- The Japanese banking crisis in 1990 was preceded by a real estate and stock market boom, fueled by bank lending and loose monetary policy.

- The BOJ followed loose monetary policy after the Plaza Accord of 1985.

- The bust was triggered by BOJ tightening to stem the asset price boom.

- The collapse in asset prices created bank insolvency.

- The bailout costs of the bank rescue increased the Debt-to-GDP ratio, but Japan did not default.

Fiscal Crises and Financial Crises

- <u>The Nordic financial crisis of 1991-1992</u> involved a banking crisis, currency crisis and large fiscal bailouts

- Liberalization of the financial sector and capital account in the 1980s led to a bank credit fueled asset price boom.

- The EMS crisis triggered the bust and crises.

- Loan losses in Norway, Sweden and Finland were high, but the fiscal resolutions did not trigger a fiscal crisis.

Fiscal Crises and Financial Crises

- The Asian Crisis of 1997-98 involved banking, currency and debt crises

- The crises were connected by government guarantees and original sin.

- The Asian Tigers borrowed abroad extensively in foreign currency.

- The risk with original sin is that if the country has a currency crisis and devalues its currency it will have to generate greater tax revenues in domestic currency to service its foreign debt.

- This depresses the real economy and increases the likelihood of a foreign default.

- Also banks funded their loans with foreign securities hence after devaluation they could become insolvent.

Fiscal Crises and Financial Crises

- The Asian Crisis led to Third Generation speculative attack models.

- According to Krugman (1998) , the Asian banks engaged in risky lending on the assumption they would be bailed out.

- The loans were financed abroad in foreign currency

- The capital inflow and bank credit boom financed an asset boom , overinvestment and a current account deficit.

- A devaluation led to a financial crisis because the banks with foreign liabilities became insolvent.

- Dooley (2000) tells a similar story. He emphasized the liabilities of the monetary authorities backing the safety net as an alternative claimant on the CBs international reserves.

Fiscal Crises and Financial Crises

- Burnside, Eichenbaum and Rebelo (2004) emphasize the role of government guarantees.

- When a devaluation occurs the banks default on their foreign debt but the government doesn't have the resources to pay for the bailout.

- This can lead to a currency crises if the MA prints money or a fiscal crisis.

- Corsetti, Pesenti and Roubini(1999) tell a similar story.

Fiscal Crises and Financial Crises

- ## The Eurozone Crisis 2010-2014

  – Reinhart and Rogoff provide comprehensive evidence on the link between banking and fiscal crises

  – They show that banking crises often precede debt crises and that the debt to GDP ratio by 86% in the 3 years following a banking crisis

  – This leads to a downgrading of credit rating and possible default

  – The EZ crisis seems to fit the pattern well

Fiscal and Financial Crises

- During the 2007-2008 crisis many European countries engaged in expensive bond financed bank bailouts which increased the fiscal deficit.

- Eg Ireland which in September 2008 guaranteed its whole financial system.

- Deficits also increased because of expansionary government expenditure and reduced tax revenues.

- Against this background the Greek government announcement that it had falsified its books set the stage for the EZ debt crisis.

- The threatened sovereign default by Greece fed into a banking crisis, because banks in Greece and other financially integrated EZ countries held large amounts of Greek and other peripheral EZ sovereign debt.

Fiscal and Financial Crises

- Bolton and Jeanne (2011) model the interconnection between sovereign risk and the banking system in a currency union where banks hold other countries sovereign debt.

  – Government bonds serves as safe collateral and allows banks to increase leverage.

  – But the default by one member spreads to the others via the weakening of bank portfolios.

Fiscal and Financial Crises

- Gennaioli , Martin and Rossi (2014) model the interconnection between sovereign default and the banking system.

- Banks hold sovereign debt as collateral. A debt crisis leads to a credit crunch and a fall in real income.

- Acharya, Drechsler and Schnabl(2013) model a two way connection between fiscal crises and banking crises.

- Bank bailouts lead to an increase in sovereign risk. This weakens the banking system.

- Empirical evidence on the spreads between bank CDS and Sovereign CDS shows how the Irish bailout led to the transfer of risk from the banks to to the government.

Fiscal and Financial Crises

- Modi and Sandri (2012) show how after the Bear Stearns bailout in March 2008 spreads increased in countries which had vulnerable financial sectors likely to be bailed out.

- After Lehman failed in September 2008 spreads increased dramatically in countries with higher debt ratios.

- Then after the failure of Anglo Irish bank in January 2009 spreads increased across the EZ reflecting the increased vulnerability of the financial systems of all the member countries.

Section II

EMPIRICS OF FINANCIAL CRISES OVER THE LONG-RUN

Datasets for Financial Crises

- Long-Run Data
  - Bordo, Eichengreen, Klingebiel, Martínez-Peria (BEKM), 1880-1997, 21/55 countries: banking, currency and twin crises

  - Reinhart & Rogoff, mainly post-1800 with an increasing sample size. 70 countries in the 20th century: banking, currency and debt crises

  - Jordà, Schularick and Taylor (2011), 17 countries, 1870-2011: banking crises

- Recent Data
  - Laeven and Valencia (2013), 162 countries, 1970-2012: banking , currency and debt crises

- Dating of financial crises: leading authors disagree on the definition of a crisis leading to different conclusions about the impact and causes of crises.

Crises definitions

- <u>Table 1</u> shows definitions for dating various types of crises.

- There is considerable disagreement on the definitions: e.g. for banking crises, authors disagree about how many banks must be closed or what system's capital must be impaired for a crisis to be classified as systemic.

Table 1 Crisis Definitions Four Leading Data sets

Authors	Sample	Banking Crisis Definition	Currency Crisis Definition	Debt Crisis Definition
Bordo et. al. (2001)	1880-1939 21 Advanced Countries 1945-1997 21 Advanced Countries + 34 Less Developed Countries and Emerging Market Economies	Financial distress resulting in the erosion of most or all of aggregate banking system capital as in Caprio and Klingebiel (1996)	Forced change in parity, abandonment of a pegged exchange rate, or an international rescue. Or: an exchange market pressure (EMP) above a critical threshold (calculated as a weighted average of exchange rate change, short-term interest rate change, and reserve change relative to the same for the center country, the UK before 1913 and the US after). A crisis is said to occur when this index exceeds a critical threshold. We score an episode as a currency crisis when it shows up according to either or both of these indicators	No debt crises are dated in this data set.

Reinhart and Rogoff (2009)	1800-2011 70 Countries	A banking crisis occurs when there are one of two types of events: (1) bank runs that lead to the closure, merging, or takeover by the public sector of one or more financial institutions; or (2) if there are no runs, the closure, merging, takeover, or large-scale government assistance of an important financial institution (or group of institutions), that marks the start of a string of similar outcomes for other financial institutions.	Reinhart (2010) refers to a working paper version of Reinhart and Rogoff (2011) stating they follow Frankel and Rose (1996). Frankel and Rose date a currency crisis as a period with a nominal depreciation of more than 25% which represents a greater than 10% increase in the rate of depreciation. Reinhart's website provides the following definition: "An annual depreciation versus the US Dollar…of 15 percent or more.	"External debt crises involve outright default on payment of debt obligations incurred under foreign legal jurisdiction, repudiation, or the restructuring of debt into terms less favorable to the lender than in the original" (Reinhart and Rogoff, 2011)
Laeven and Valencia (2012)	1970-2011 162 countries	Two conditions 1."Significant signs of financial distress in the banking system (as indicated by significant bank runs, losses in the banking system, and/or bank liquidations) 2.Significant banking policy intervention measures in response to significant losses in the banking system.	Nominal depreciation of the currency against the dollar of at least 30% that is also 10 percentage points higher than the rate of depreciation in the year before.	"default and restructuring" Data from Calomiris and Beim (2001), World Bank (2002), Sturzenegger and Zettlemeyer (2006), IMF staff reports and reports from rating agencies.
Taylor (forthcoming)/ Jordà et. al. (2011)	1870-2011 17 Countries	Taylor (2015) and Jordà et. al. (2011)describe their coding as following Bordo et. al. Reinhart and Rogoff, Laeven and Valencia and Cechetti et. al (2009).	Not dated.	Not dated.

Financial Crises: the Historical Record

- We compare outcomes for various chronologies and across four time periods
- The classical gold standard (1880-1913); the interwar period (1919-39); Bretton Woods (1945-1972);the recent period of globalization (1973 to the present)
- We show the sample probabilities of experiencing a financial crisis
- It is calculated as the ratio of the number of years in which the set of countries in the sample is in the first year of a crisis to the total number of country years

Figure 1 shows the sample percentage of country-year observations for the first year of four different types of financial crises.

Figure 1a Banking Crisis Frequencies 1880-2012
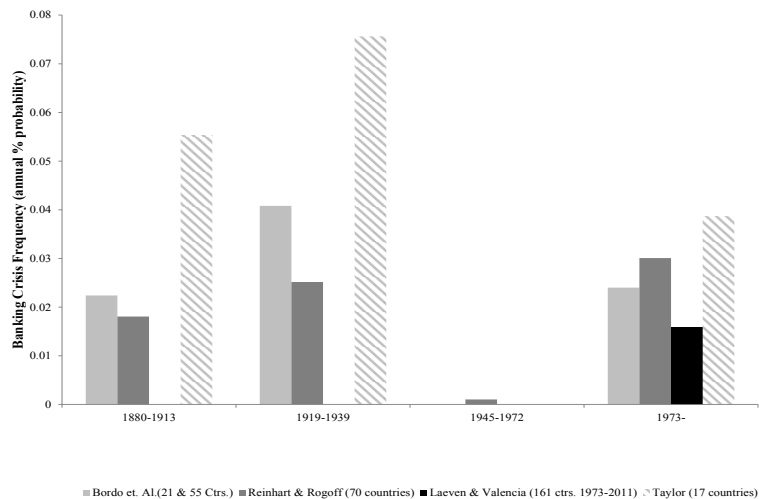
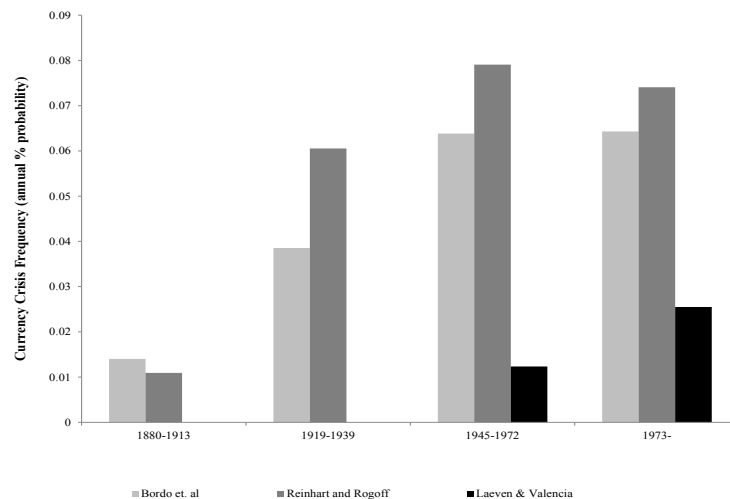Figure 1b Currency Crisis Frequencies. 1880-2009

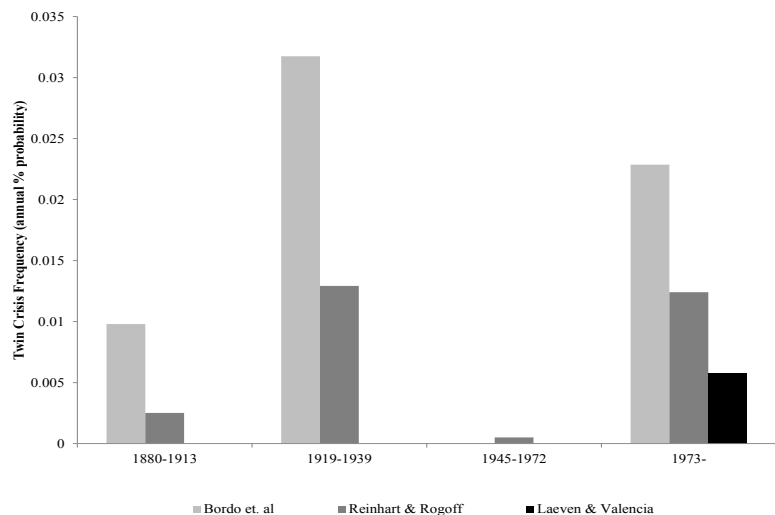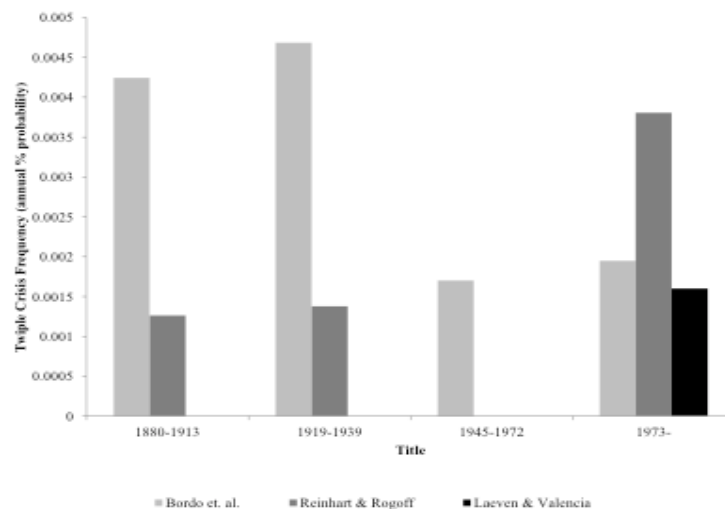Figure 1c Twin Crisis Frequencies Three Datasets, 1880-2012

Figure 1d Triple Crisis Frequencies, Four Datasets, 1880-2012

Crisis frequencies

- Currency crises are the most frequent type of crises followed by banking crises, debt crises, twin crises and finally triple crises

- There is some coincidence in the different data sets between the frequencies of types of crises

- Figure 1 shows that Reinhart and Rogoff and Taylor display a higher probability of having a banking crisis than Bordo et al.

- Reinhart and Rogoff show that triple crises are now more frequent than in the earlier periods, in contrast to Bordo et al that they were more likely before WWII.

Figure 2 shows the number of crises that occur alone or considered with other types of crises. As it can be seen, the coincidence of the three types of crises is much higher today than in the past.
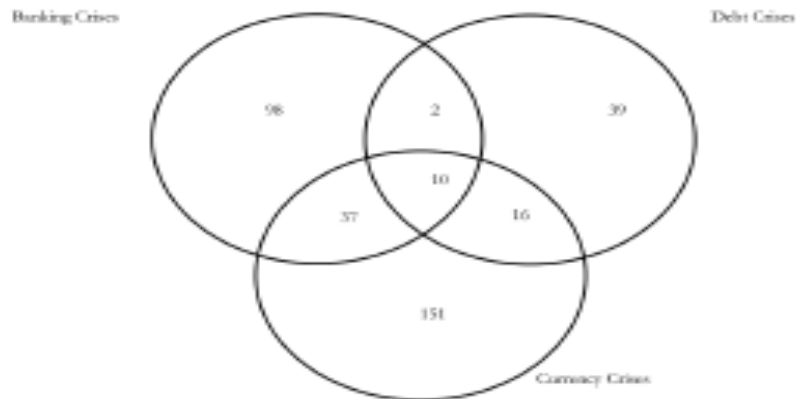
Figure 2a Coincidence of Banking, Currency and Debt Crises, 1880-1913 (Bordo et. al.)
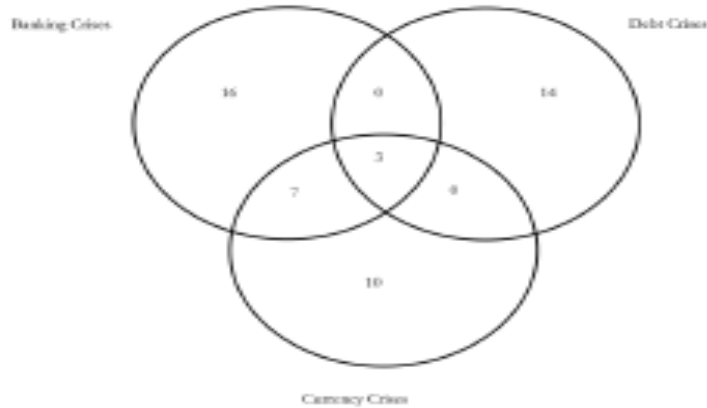
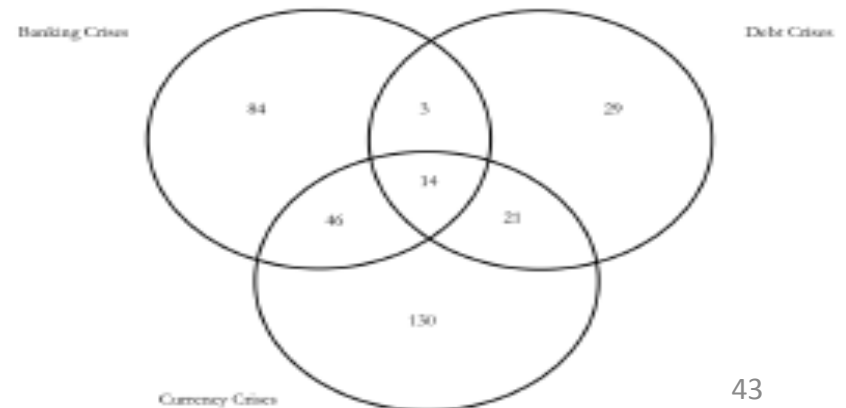
Figure 2b Coincidence of Banking, Currency and Debt Crises, 1919-1939 (Bordo et. al.)
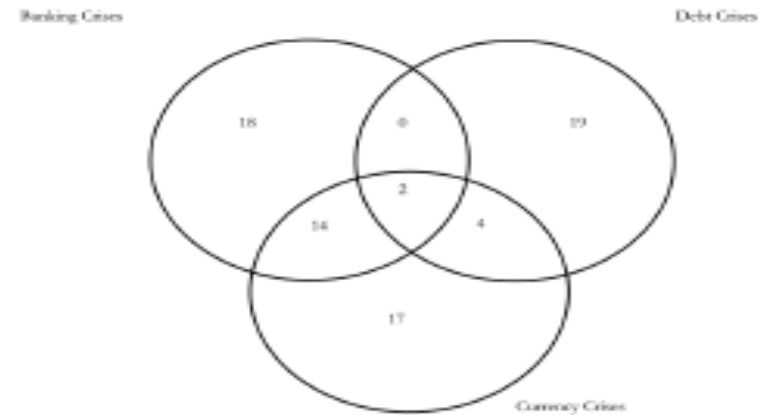
Figure 2c Coincidence of Banking, Currency and Debt Crises, 1970-2012 (Laeven and Valencia)

Figure 2d Coincidence of Banking, Currency and Debt Crises within a two year Window, 1970-2012 (Laeven and Valencia)

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Figure 2 (continued)

Figure 2e Coincidence of Banking, Currency and Debt Crises,
1970-2012 (Reinhart and Rogoff dates)
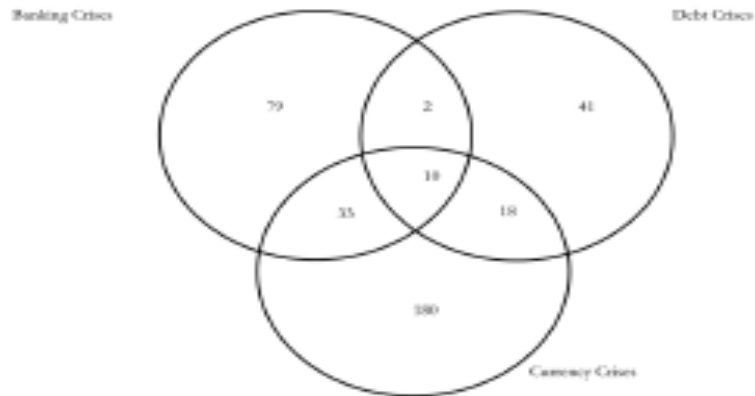
Notes to Figures 2a-2e: Source data for Figures 2a and 2b is Bordo et. al. (2001) Source data for Figures 2c and 2d is Laeven and Valencia (2013). Source data for Figure 2e is Reinhart and Rogoff (2008).

Disagreement and Classification Uncertainty

- In table 2, we compare 4 different data sets.

- The average percentage of times that the comparisons agree is 0.43, excluding Bretton Woods, where they all agree.

- Other reasons for disagreement include the demarcation of twin crises and conflicting historical sources.

Table 2a Comparison of Leading Crisis Chronologies, 1880-1913

PRE-WWI	1880-1913 Bordo et. al. vs. RR				

Bordo et. al.		Reinhart & Rogoff		% agree	
		No crisis	Banking Crisis	same year	+/-1 year
	No crisis	681	17	0.33	0.38
	Banking Crisis	5	11		

21 countries (21 in Bordo et. al. & 70 in Reinhart & Rogoff)

	1880-1913 RR vs. Taylor				

Reinhart & Rogoff		Taylor		% agree	
		No crisis	Banking Crisis	same year	+/-1 year
	No crisis	533	16	0.36	0.55
	Banking Crisis	13	16		

17 countries (70 in Reinhart & Rogoff & 17 in Taylor)

	1880-1913 Bordo et. al. vs. Taylor				

Bordo et. al.		Taylor		% agree	
		No crisis	Banking Crisis	same year	+/-1 year
	No crisis	538	20	0.30	0.41
	Banking Crisis	8	12		

17 countries (21 in Bordo et. al. & 17 in Taylor)

Table 2b Comparison of Leading Crisis Chronologies, 1919-1939

INTERWAR	1919-1939 Bordo et. al. vs. RR				

Bordo et. al.		Reinhart & Rogoff		% agree	
		No crisis	Banking Crisis	same year	+/-1 year
	No crisis	409	14	0.31	0.34
	Banking Crisis	8	10		

21 countries (21 in Bordo et. al. & 70 in Reinhart & Rogoff)

	1919-1939 RR vs. Taylor				

Reinhart & Rogoff		Taylor		% agree	
		No crisis	Banking Crisis	same year	+/- 1 year
	No crisis	321	2	0.69	0.74
	Banking Crisis	9	25		

17 countries (17 in Taylor & 70 in Reinhart & Rogoff)

	1919-1939 Bordo et. al. vs. Taylor				

Bordo et. al.		Taylor		% agree	
		No crisis	Banking Crisis	same year	+/- 1 year
	No crisis	323	5	0.65	0.87
	Banking Crisis	7	22		

17 countries (21 in Bordo et. al. & 17 in Taylor)

Table 2c Comparison of Leading Crisis Chronologies, 1950-1972

BRETTON WOODS	1950-1972 Bordo et. al. vs. RR				

Bordo et. al.		Reinhart & Rogoff		% agree	
		No crisis	Banking Crisis	same year	+/- 1 year
	No crisis	539	0	1.00	1.00
	Banking Crisis	0	0		

21 countries (21 in Bordo et. al. & 70 in Reinhart & Rogoff)

	1950-1972 RR vs. Taylor				

Reinhart & Rogoff		Taylor			
		No crisis	Banking Crisis	% Agree	+/- 1 year
	No crisis	391	0	1.00	1.00
	Banking Crisis	0	0		

17 countries (17 in Taylor & 70 in Reinhart & Rogoff)

	1950-1972 Bordo et. al. vs. Taylor				

Bordo et. al.		Taylor			
		No crisis	Banking Crisis	% Agree	+/- 1 year
	No crisis	391	0	1.00	1.00
	Banking Crisis	0	0		

17 countries (21 in Bordo et. al. & 17 in Taylor)

Table 2d Comparison of Leading Crisis Chronologies, 1973-2012

POST-BRETTON WOODS	1973-1997 Bordo et. al. vs. RR				

Bordo et. al.		Reinhart & Rogoff		% agree	
		No crisis	Banking Crisis	same year	+/- 1 year
	No crisis	1171	25	0.37	0.37
	Banking Crisis	9	20		

49 countries (55 in Bordo et. al. & 70 in Reinhart & Rogoff)

	1973-2010 RR vs. Taylor				

Reinhart & Rogoff		Taylor		% agree	
		No crisis	Banking Crisis	same year	+/- 1 year
	No crisis	614	6	0.59	0.70
	Banking Crisis	7	19		

17 countries (17 in Taylor & 70 in Reinhart & Rogoff)

	1973-1997 Bordo et. al. vs. LV				

Bordo et. al.		LV		% agree	
		No crisis	Banking Crisis	same year	+/- 1 year
	No crisis	1308	12	0.26	0.26
	Banking Crisis	19	11		

55 countries (55 in Bordo et. al. & 162 in Laeven & Valencia)

Table 2 (continued)

Table 2e Comparison of Leading Crisis Chronologies, 1973-2012 (cont.)

1973-1997
Bordo et. al. vs. Taylor

		Taylor		% agree	
		No crisis	Banking Crisis	same year	+/- 1 year
Bordo et. al.	No crisis	407	6	0.39	0.39
	Banking Crisis	5	7		

17 countries (55 in Bordo et. al. & 17 in Taylor)

1973-2011
RR vs. LV

		LV		% agree	
		No crisis	Banking Crisis	same year	+/- 1 year
Reinhart & Rogoff	No crisis	2520	24	0.26	0.29
	Banking Crisis	51	27		

70 countries (70 in Reinhart & Rogoff & 162 in Laeven & Valencia)

1973-2010
Taylor vs. LV

		LV		% agree	
		No crisis	Banking Crisis	same year	+/- 1 year
Taylor	No crisis	618	3	0.54	0.59
	Banking Crisis	10	15		

17 countries (17 in Taylor & 162 in Laeven and Valencia)

Notes to Tables 2a-2e: Tables present cross-tabulations of banking crisis indicators for each of four sources (Bordo et. al., Reinhart and Rogoff, Taylor and Laeven and Valencia) in four periods. We restrict attention to the first year of a banking crisis for a country. In each entry we show the number of non-crisis country-years, and the number of country-years with a crisis in either of two datasets for the countries that are common to both datasets. The entry in row 2 column 2 of each table records the number of times both datasets agree. The last two columns provide a measure of the agreement between sources calculated as the percentage of all crisis-years dated within the period and the country sample in which the two sources agree. We provide this percentage for crises occurring in the same year and then allow for a one year-window to allow for small variations in timing.

Causes of Crises

- Following the recent crisis, a new consensus view has assigned a primary value to credit booms as the key determinant and predictor of financial crises.

- But not all the banking crises are driven by credit booms.

- A more satisfactory approach to understanding the drivers of financial crises recognizes that the micro-structure of the financial system matters as well as credit.

Causes of Crises

- There are several approaches to understanding the causes of crises:

  1   Early warning indicators (Kaminsky and Reinhart (1999))

  – They check whether a variable signaled a banking crisis within a 12-month window.

  – They then find thresholds where changes/levels of the variable minimize the noise-to-signal ratio.

  – They classify 16 variables as Financial Sector, External Sector, Real Sector and Fiscal Sector.

  – The best predictors for banking crises are: appreciation of the real exchange rate, equity price boom and the money multiplier.

  – Recent research (Babecký et al. (2014), Drehman et al. (2012), Gourinchas and Obstfeld (2012)) emphasize the financial cycle (domestic credit/GDP, equity and property prices).

Causes of Crises

2 <u>Logit analysis</u> (Demirgüc-Kunt and Detragiache (1998))

- They emphasize the role of financial liberalization in environments with weak regulatory capacity and weak institutions.
- Deposit insurance and guarantee lead to regulatory forbearance and crises.

- Recent research by Bussiere and Fratzscher (2006), Babecký et al. (2014), Rose and Spiegel (2012) find that the early warning indicators by Kaminsky and Reinhart (1999) do not hold up for recent crisis.

- IMF(2009) finds considerable heterogeneity across countries on the causes of crises.

Causes of Crises

- Recent research by Caballero (2014) finds that capital inflow bonanzas and credit booms are significant predictors of banking crises.

- In sum, the literature finds that many factors in addition to the growth of credit can explain financial crises.

Output Losses of Financial Crises

- Most of the literature agrees that crises are associated with significant output losses.

- Table 3 summarizes the literature on the impact of financial crises on output.

- Output loss is defined as deviation from a pre-crisis peak in output or a pre-crisis output trend

Table 3 Definitions and Values of Output Losses from Financial Crises

Authors	Sample	Crisis Definition	Methodology for Calculating the Economic Costs of Financial Crises	Average "losses"
Bordo et. al. (2001)	1880-1939 21 Advanced Countries 1945-1997 21 Advanced Countries + 34 LDCs and Emerging Markets	Banking Crises	Cumulative loss of output between onset and recovery found by subtracting pre-crisis trend growth from actual growth. Recovery occurs when growth obtains its pre-crisis trend level.	7% (21 countries, 1973-1997) 6.2 % (56 countries, 1973-1997)
Hoggarth, Reis, and Saporta (2002)	1977-1998 47 Countries 47 Banking Crises	Banking crises (systemic and borderline)	1. **GAP1** sum of the differences between growth in potential output and actual output growth during the crisis period. Potential growth = arithmetic average of GDP growth in the three years prior to the crisis. End of crisis is when output growth returns to trend. 2. **GAP2** Cumulative difference between level of potential output and actual output over the	GAP1 = 14.5% GAP2 = 16.5%

Hoggarth, Reis, and Saporta (2002) cont.			crisis period. Output potential is based on trend growth over the 10-year pre-crisis period using an HP filter.	
Hutchison and Noy (2005)	1975-1997 24 emerging markets	Twin crises	Regressions of growth of real GDP on crisis indicators and lags.	Average loss of GDP of 15-18% over the average duration of 3-4 years after the onset of a crisis.
Dell'ariccia et. al (2008)	1980-2000 41 countries 48 Crises	Banking crises: there were extensive depositor runs; the government took emergency measures to protect the banking system, such as bank holidays or nationalization; the fiscal cost of the bank rescue was at least 2 percent of GDP; or non-performing loans reached at least 10 percent of bank assets.	Marginal impact of banking crises on the annual growth rate of sectoral value added	Growth rate is 1.1 percentage points lower in sectors with highly dependent on external finance.
Angkinand, A.P. (2009)	1970s-2003 35 countries 47 crises (systemic and non-systemic)	Banking Crisis identified in Caprio and Klingebiel (2003).	Cumulative deviation in real GDP from an extrapolated HP trend. Calculated between the onset of a crisis and time when GDP reaches the trend.	3.13% (mean for all banking crises) 3.99% (mean for systemic banking crises)

Cechetti, Kohler, Upper (2009)	1980-2007 Number of Countries is not stated 40 crises	Banking Crisis defined as in Laeven and Valencia.	Output loss is the cumulative loss in GDP from the onset of a crisis until GDP reaches the pre-crisis peak.	18.4% (mean) 9.2% (median)
Laeven and Valencia (2013)	1970-2011 162 countries	Systemic Banking Crises possibly accompanied by currency, or debt crises or both.	Cumulative loss of real GDP between onset of crisis and 3 years after crisis starts calculated as the difference between actual output and the HP filter trend calculated over the 20 years prior to a crisis (or fewer years if data are not available)	23% (mean) 32% (mean advanced) 26% (mean emerging markets)
Jordà et. al. (2013)	1870-2008 14 Countries	"Financial Recessions" (i.e., recessions associated with systemic financial crises) with and without large growth in real credit.	Local projections from tear T+1, to T+5 of log differences of GDP per capita in year t from peak year level.	16.9% Cumulative deviations from peak for "financial recessions" for T to T+5 (Table 7 Row 1, p. 19)
Reinhart and Rogoff (2014)	1800-2011 70 Countries	100 Systemic Banking Crises defined as in Reinhart and Rogoff (2009) possibly accompanied by currency, or debt crises or both.	1. Peak to trough decline in GDP per capita 2. Severity index = -1*(peak to trough decline in GDP per capita) + number of years until peak level of GDP per capita is attained. This is defined as recovery time.	11.5% (mean) 8.8% (median) 8.3 years peak to recovery (mean) 6.5 years peak to recovery (median)
da Rocha and Solomou (2015)	24 countries 1920-1938 19 crises	Systemic banking crises. "classification is based on qualitative informed judgement, documenting the extent of financial distress in the banking system of a country."	Cumulative growth in real GDP and industrial production up to 7 years after a crisis starts.	33% cumulative deviations from peak for T to T+7.

Output Losses

- The key issue is causality. Real shocks may cause output to decline leading to problems in the financial sector.

- But financial shocks can generate output declines.

- Bordo et al (2001) compared recessions without financial crisis to recessions with financial crises.

- They found that financial crises are associated with higher output costs.

- Jordà , Schularick and Taylor (2013) report statistically and economically significant differences between output downturns associated with financial crises and downturns not associated with financial crises, even after conditioning on a number of predetermined macro variables.

Output Losses

- Using crisis dates from Bordo et al, Reinhart and Rogoff and Laeven and Valencia and output per capita from Barro and Ursua (2008) we calculate output losses in different periods.

- We use one methodology to compare output losses in a consistent fashion over the long-run.

- We study the cumulative deviation of per capita GDP from the pre crisis trend level from the outbreak of the crisis to 3 years later.

- Pre crisis trend is given by the average change in log points of the log of real per capita GDP up to 10 years before the crisis.

Figure 3a Output Losses for Three Varieties of Crises 1880-1913 Bordo et. al. vs. Reinhart & Rogoff
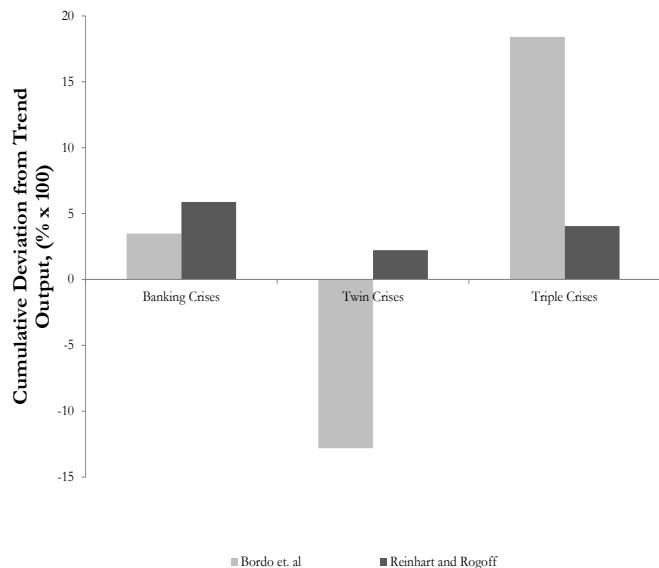
Figure 3b Output Losses, Three Varieties of Crises 1919-1939 Bordo et. al. and Reinhart & Rogoff
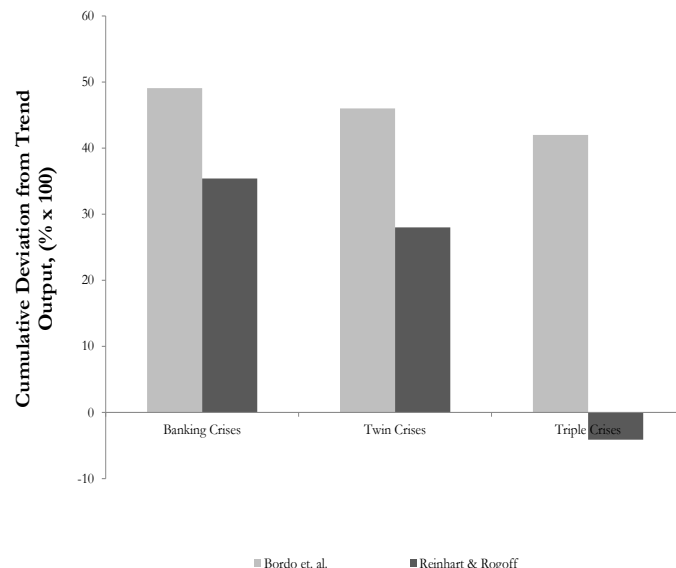
Figure 3c Output Losses, Three Varieties of Crises 1973-1997 (Bordo et. al.), 1973-2012 (Reinhart and Rogoff), 1973-2012 (Laeven and Valencia)
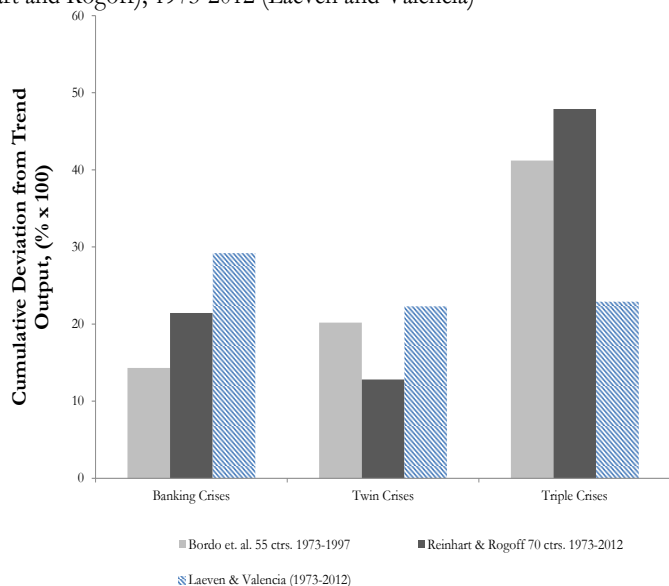
Figure 3d Output Losses from Banking Crises 1973-1997 Three Data Sets.
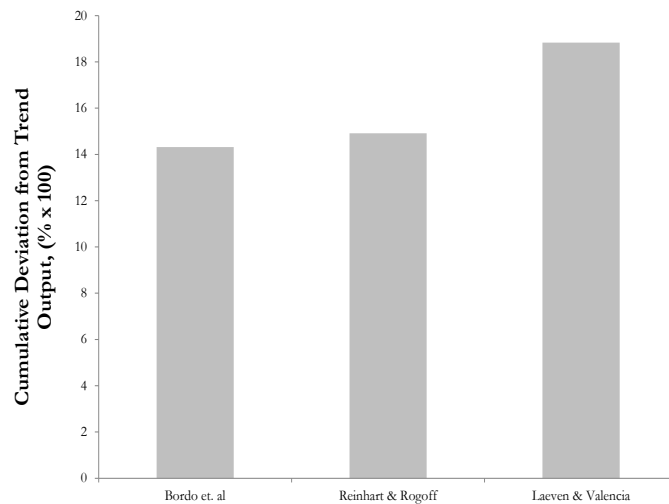
Notes to Figures 3a-3d: Output losses are claculated as the difference between the level of GDP per capita in the three years following a crisis and the extrapolated trend of GDP per capita. The trend is calcuated as the average growth rate in the 10 years prior to crisis. See the text for additional information.

Output Losses

- Losses are large: 1880-1913, 3-6%; interwar, 40%; post Bretton Woods, 14-29%.

- The range of losses reflects different samples of countries, different filters across the different studies.

- Figure 4 on next slide provides some country examples.

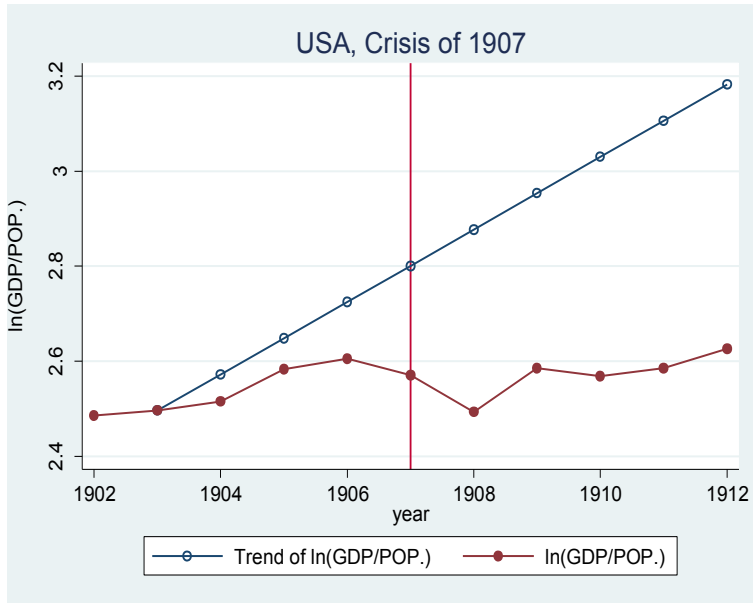Figure 4a GDP per person Actual and Counterfactual, USA, 1907

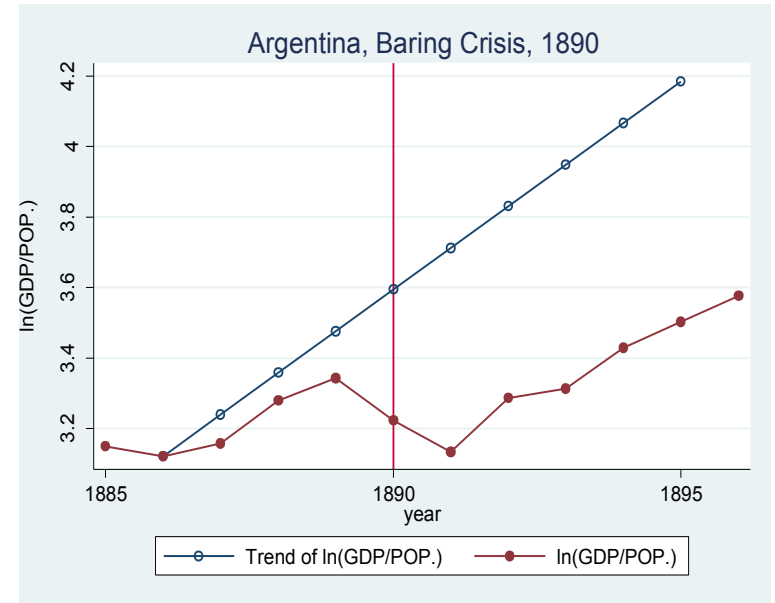Figure 4b GDP per person Actual and Counterfactual, Argentina, Baring Crisis

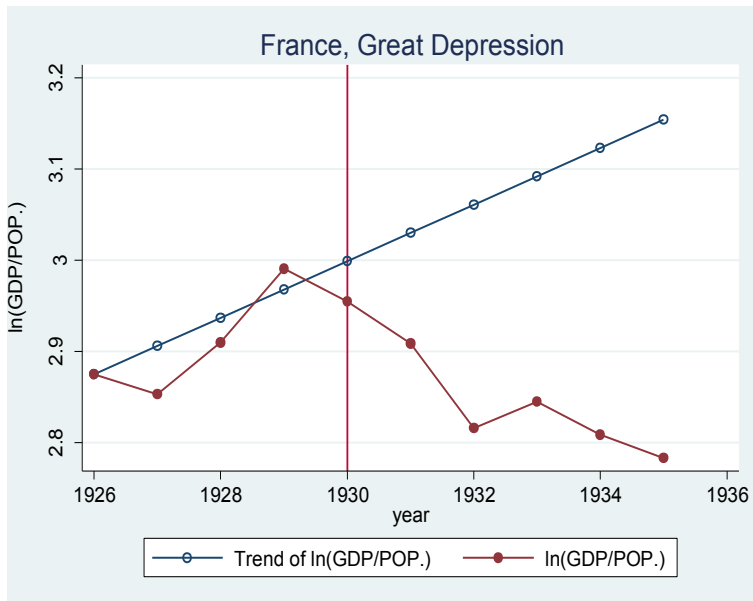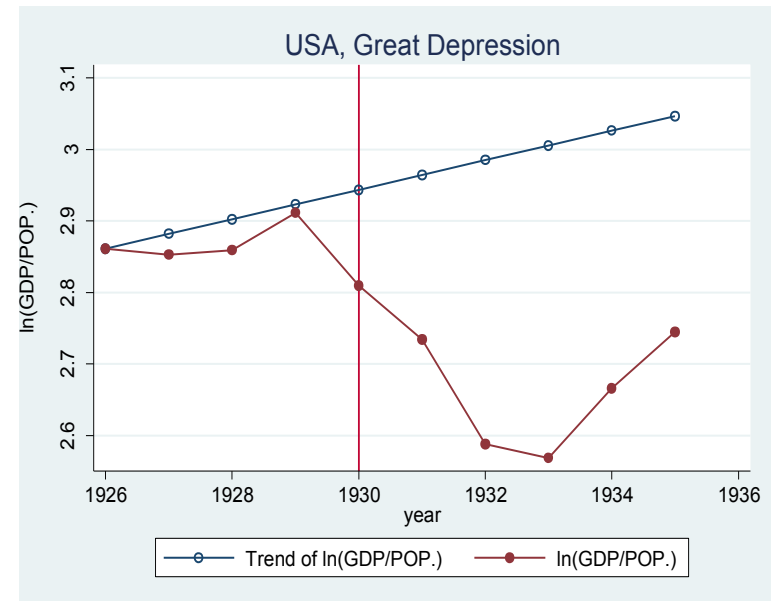Figure 4c GDP per person Actual and Counterfactual, France, Great Depression

Figure 4d GDP per person Actual and Counterfactual, United States, Great Depression

Output Losses

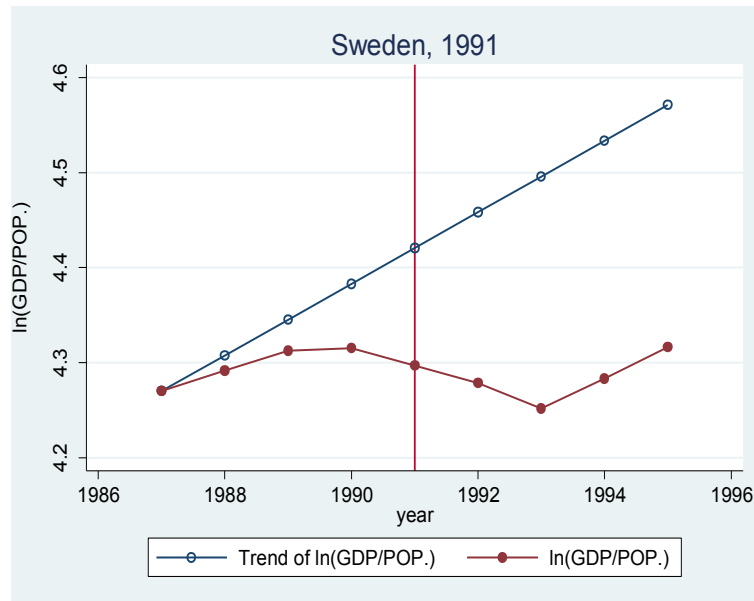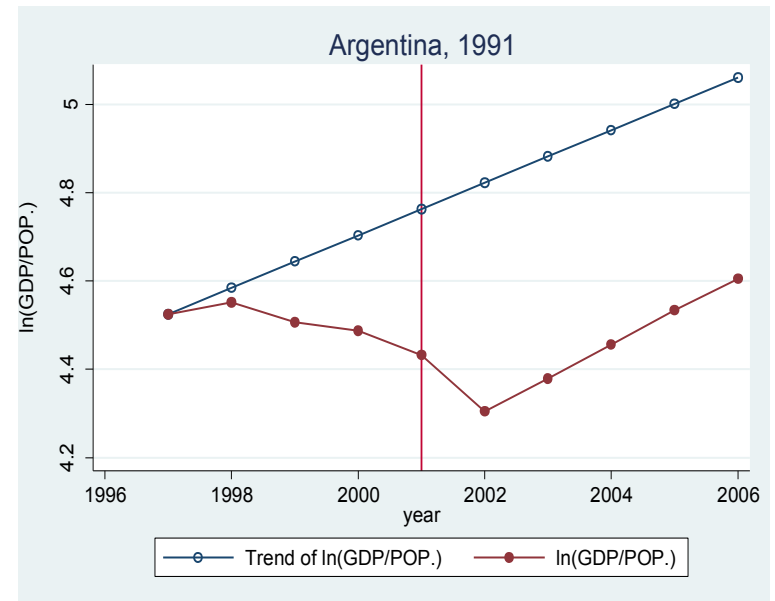Figure 4e GDP per person Actual and Counterfactual, Sweden, 1991   Figure 4f GDP per person Actual and Counterfactual, Argentina, 2001

Notes to Figures 4a-4f: Data are underlying Bordo et. al except for Figure 4f. Data real GDP per capita for Figure 4f are from the World Economic Outlook database. Trend (counterfactual) line is calculated based on simple extrapolation of the average growth rate in the previous 10 years.

Output Losses

- One surprise is that output losses seem to be larger in the recent period compared to pre-WWI, despite today's monetary authorities reliance on liquidity support, fiscal interventions and other policies to remedy the market failures associated with financial shocks.

- Perhaps the pre-1914 economies were more flexible and the financial sector smaller.

- The losses today are lower than in the interwar when policy was counterproductive.

- An interesting avenue for future empirical research is to study the size of output losses after properly accounting for variance in policy action.

Empirics: Fiscal Crises and Banking Crises and the Fiscal Crisis Trilemma

- Recent research has focused on the impact of banking crisis on the probability of a debt crisis, especially in advanced countries
- Average rise in the debt to GDP (Laeven and Valencia, 2013)
  - all systemic crises = 12 %
  - advanced economies = 21.4%.
  - Average rise in debt due to bailouts, rescues and guarantees = 6%

Empirics: Fiscal Crises and Banking Crises

- Tagkalakis (2013) empirically examines the feedback loop from fiscal policy to financial markets and back in a sample of 20 OECD countries 1990-2010.

- Fiscal instability leads to financial instability and financial instability leads to fiscal instability via bailouts.
  - Rise in debt/deficits depends positively on the financial sector

Fiscal Tradeoffs Financial Development and Financial Crises

- Tagkalakis (2013) results suggest the possibility of a tradeoff for countries along the lines of a trilemma
- Assume that most financially developed countries will inevitably face a crisis at some point

- Two out of three choices may be possible

  - Large financial sector
  - Debt-financed rescues of the financial sector during a financial crisis
  - Counter-cyclical/discretionary fiscal policy during financial recessions

Fiscal Tradeoffs, Financial Development and Financial Crises

- Logic : a country with a large financial sector will be more likely to have financial crisis

- If so the government can either provide a large bailout package and use up fiscal space

- Or else it could reduce the size of the bailout and devote its fiscal space to discretionary fiscal policy

- The smaller the financial sector the less binding will be the fiscal constraints since the size of the bailout would be smaller

Fiscal Tradeoffs, Financial Development and Financial Crises

- Eg US post 2007 had a large financial sector but its bailout was relatively small at 4.5% of GDP

- The debt GDP ratio rose by 19%

- Versus Greece which had a rise in the debt ratio by 17% but a much larger recession and the fiscal bailout costs were 27% (which does not include the external rescues)

- The ability of countries to finance either a bailout or use discretionary fiscal policy depends on the willingness of capital markets to fund deficits

- Thus the trilemma is more applicable for countries which have better debt sustainability at the beginning of their crisis

Fiscal Tradeoffs, Financial Development and Financial Crises

- To test the financial dilemma we use data from Laeven and Valencia (2012) for 19 banking crises in 18 advanced countries since 1970.

- We use the following regression:

$$\ln\left(\Delta \frac{Debt_{it}}{GDP_{it}}\right) = \kappa + \theta_1 \left[\ln\left(\Delta \frac{Fiscal\ Costs_{it}}{GDP_{it}}\right)\right] + \theta_2 \left[\ln\left(\Delta \frac{Discretion_{it}}{GDP_{it}}\right)\right] + \varepsilon_{it}$$

- Discretion is the change in the Debt-to-GDP ratio minus the ratio of fiscal costs to GDP.

Results

$$\ln\left(\Delta\frac{Debt_{it}}{GDP_{it}}\right) = \underset{(0.13)}{0.69} + \underset{(0.03)}{0.25}\left[\ln\left(\Delta\frac{Fiscal\ Costs_{it}}{GDP_{it}}\right)\right]$$

$$+ \underset{(0.04)}{0.74}\left[\ln\left(\Delta\frac{Discretion_{it}}{GDP_{it}}\right)\right]$$

- The results suggest that the coefficients on the two regressors add up to one and imply a tradeoff between bailout and discretion.
- Figure 5 plot the predicted iso-line at given levels of the change in the ratio of Debt/GDP as well as the data for the 18 countries and 19 crises in the sample.

Results

Figure 5 Fiscal Costs of Bailouts vs. the Rise in Government Debt/GDP from other Non-Bailout Costs, 19 Crises, 1970-2012
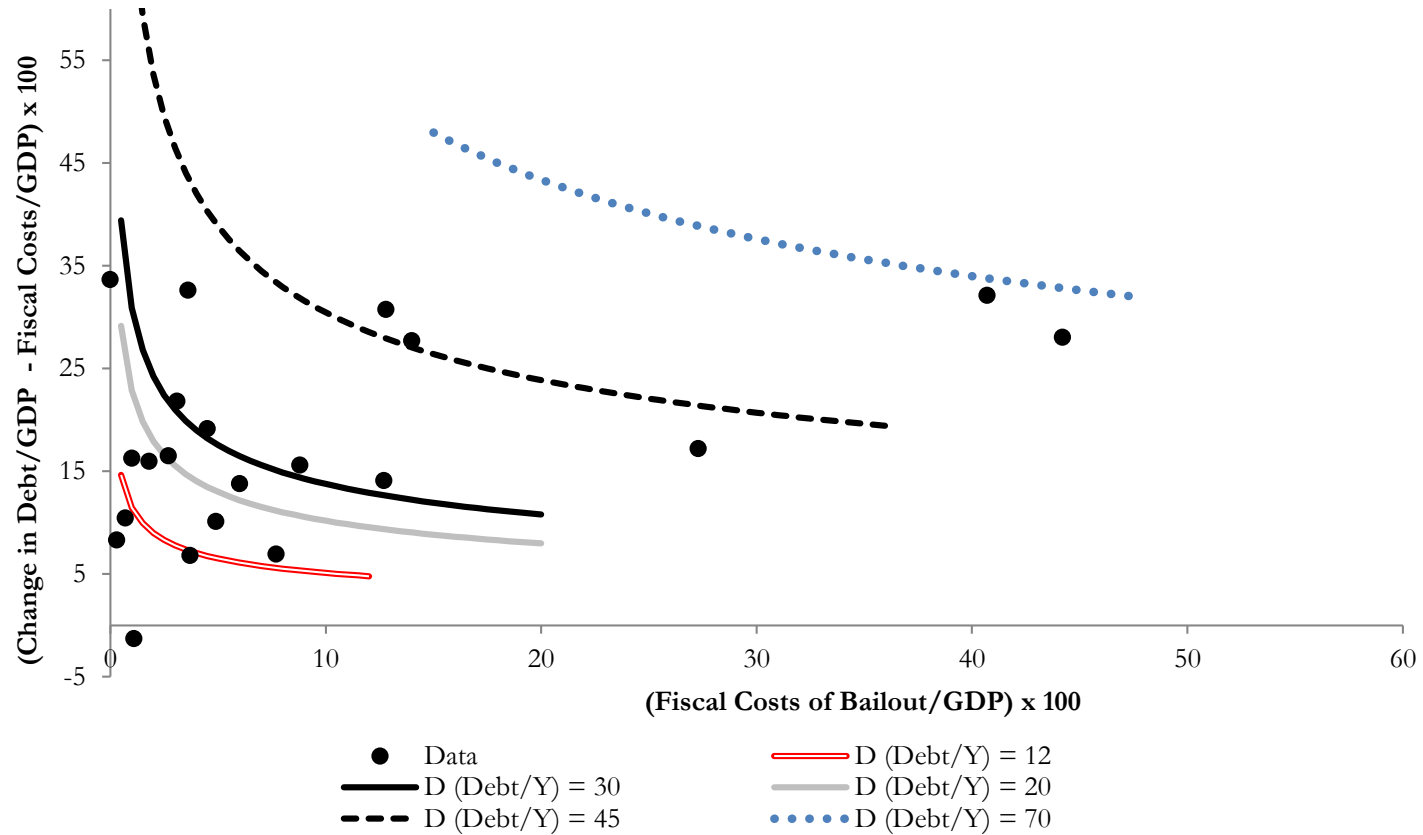
Notes to Figure 5: Data are from Laeven and Valencia (2012). Iso-lines are the predicted values for the debt to GDP ratio from equation (1).

Results

- The rise in the ratio of Debt/GDP matches the data relatively well.

- We interacted the fiscal costs variable with the size of the financial sector (domestic private credit over GDP).

- The positive interaction term implies that countries with large financial sectors devote more of their fiscal space to bailouts.

Results

$$\ln\left(\Delta\frac{Debt_{it}}{GDP_{it}}\right) = \begin{matrix}1.72\\(0.49)\end{matrix} + \begin{matrix}-0.27\\(0.24)\end{matrix}\left[\ln\left(\Delta\frac{Fiscal\ Costs_{it}}{GDP_{it}}\right)\right]$$

$$+ \begin{matrix}0.11\\0.05\end{matrix}\left[\ln\left(\Delta\frac{Fiscal\ Costs_{it}}{GDP_{it}}\right) \times \ln\left(\frac{Domestic\ Credit_{it}}{GDP_{it}}\right)\right]$$

$$+ \begin{matrix}0.72\\(0.04)\end{matrix}\left[\ln\left(\Delta\frac{Discretion_{it}}{GDP_{it}}\right)\right] - \begin{matrix}0.22\\(0.10)\end{matrix}\left[\ln\left(\frac{Domestic\ Credit_{it}}{GDP_{it}}\right)\right]$$

- A univariate regression showed that the share of the rise in the Debt-to-GDP ratio accounted for by bailouts was a positive function of the size of the financial sector.

- See figure 6.

Results

Figure 6 Fiscal Costs of a Bailout as a share of the Rise in Debt-to-GDP vs. Size of the Financial Sector

coef = .7326351, (robust) se = .55373397, t = 1.32
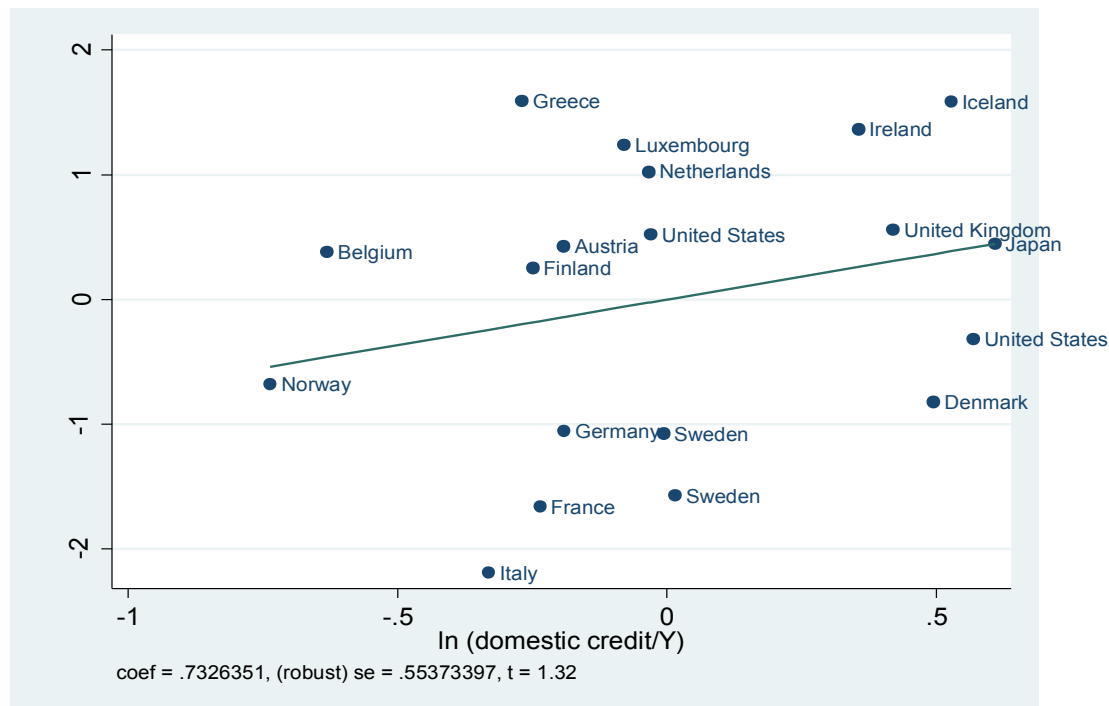
Notes for Figure 6: Figure presents the predicted regression line/partial regression plot from a univariate regression of the share in the rise in debt as a percentage of GDP against the logarithm of the level of private domestic credit to GDP. We perform a logit transform on the dependent variable prior to estimation. Debt data are from Laeven and Valencia and the credit data are from IMF IFS.

Results

- Therefore, as the size of fiscal bailouts increases, the discretionary component of the fiscal response is smaller.

- Large financial sectors necessitate large bailouts. Hence, if countries had small financial sector, the constraints on discretionary fiscal actions would be less binding.

Conclusions

- The history of financial crises shows a crisis somewhere in the world about every decade.

- Fiscal and financial crises have been increasingly linked together by the increased use of government guarantees of FIs.

- To avoid the costs of old-fashioned banking panics, government rescues has led to more virulent modern banking crises.
- This reflects the general phenomenon that, when the government intervenes to prevent costly events from occurring, then economic agents adjust their behavior accordingly and use more of the protected resource than is in the long-run optimal.

- There is a trade-off between the costs of financial crises that accompany financial development and growth and the moral hazard costs of insurance.

Conclusions

- Eliminating crises entirely is not desirable, but letting them burn out is also not ideal.

- The theoretical literature has evolved with the history of crises.

- Possible questions for future research include:
  - What do we know about optimal bank regulation, macro-prudential policy and the political economy of resolution? What do we know about the market failures that generate need for such interventions?
  - If it is hard to predict financial crises, can macro-prudential policy and fiscal rules be reliable? Empirical research based on cross-country panel data sets has only just begun here (e.g. Cerutti, Claessens and Laeven forthcoming).
  - What role does fiscal space play in the resolution phase of systemic financial crises?

Conclusions

– Is the way in which resolution proceeds dependent upon initial conditions and other institutional constraints?

– What kinds of fiscal union are feasible both economically and politically in monetary union and how important are fiscal constraints under such arrangements? What fiscal arrangements are feasible and efficient in a monetary union facing systemic shocks?

Conclusions

- Our survey of the empirical evidence reveal crucial differences over the definition of crises among the leading approaches in the literature.

- This has led to different chronologies of the incidence of crises.

- This creates problems for policy makers: who should you believe?

- Picking the wrong approach can lead to incorrect policy prescriptions.

- Maybe we should have an independent crisis dating committee like the NBER business cycle dating committee.

Conclusions

- Our survey also showed great difference in methodologies and techniques in the measurement of output losses.

- But all agree that costs of crises are high and growing.

- We still do not have a clear understanding of the magnitude of the impact of policies intended to mitigate crises.

- It is not at all obvious that credit financed asset price boom-busts (the financial cycle) is always the key explanation for crises.

- Overemphasis on a few indicators can misleading and dangerous for financial stability.

- We also do not fully understand the connection between financial development, fiscal resolutions of crises and overall fiscal goals.